PROJECT SPECIFICATIONS MANUAL FOR GYMNASIUM STRUCTURAL REPAIRS AND PROTECTION AT

BALTIMORE CITY COMMUNITY COLLEGE

2901 LIBERTY HEIGHTS AVE
BALTIMORE, MARYLAND 21215

BCCC
Baltimore City Community College

BCCC PROJECT NUMBER BCCC-FY23-PE-07C

Prepared by

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Project Specifications for Gymnasium Structural Repairs and Protection
Baltimore City Community College
BCCC Project No. BCCC-FY23-PE-07C MC Job No. 22279

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Baltimore City Community College ("BCCC" or the "College") is a state institution. For this solicitation, this procurement shall be governed by the Maryland Department of General Services policy and procedures governing construction contracts.

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- Maryland Department of General Services (DGS) Instructions to Bidders for Construction Projects (July 2022) (*eMaryland Marketplace Advantage attachment*)
- DGS General Conditions for Construction Contracts (January 2023) *(eMaryland Marketplace Advantage attachment)*
- Bid Proposal Affidavit *(eMaryland Marketplace Advantage attachment)*
- MBE Forms *(eMaryland Marketplace Advantage attachment)*
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SECTION 00 4100 – BID FORM

A. The Contractor understands that the brief one-line descriptions for each line item in the bid form does not in any way limit the scope of work for that line item. The line item costs are to assist the owner in the evaluation of the bids and to assure a clear understanding of the project. The total scope of work required for each bid item shall be determined (by the Contractor) by incorporating all requirements contained within the Contract Drawings and Specifications. A .xlsx (Microsoft Excel) version of the bid form has been provided on the eMaryland Marketplace. Bidders shall fill out Excel bid form and upload with all other required documents.

B. Scheduled alternates shall include all general conditions, overhead, profit, etc required to perform each alternate item's scope of work.

ITEM	NOTE	BASE CONTRACT REPAIR ITEMS AND SCOPE	Estimated Quantity	Unit of Measure	Unit Price	Total Price
1	MOB	Mobilization & Demobilization	1	LS	$ _____	$ _____
2	GC	General Conditions - Includes Project Management, Supervision, Progress Meetings, Phasing, Traffic Control, Access, All Required Protection, etc.	1	LS	$ _____	$ _____
3	SAB	Complete Field Survey of Concrete - Includes Patch Logs and Prepare Digital As-Builts Includes sounding of concrete and applying field marks in paint or oil pen for review by A/E	1	LS	$ _____	$ _____
4	SHA	Pre-shoring of Concrete Struts at Grid Line "A" - Includes structural steel, foundations/helical piles, excavation, sidewalk repairs, and all other work incidental to shoring operations. Assumes one (1) 25 Ton 30'-0" long helical pile per shoring location. Unit price per strut location. Refer to detail "SH-A" on SR-2.2	5	EA	$ _____	$ _____
5	SHE	Pre-shoring of Concrete Struts at Grid Line "E" - Includes structural steel, foundations/helical piles, excavation, sidewalk repairs, and all other work incidental to shoring operations. Assumes two (2) 18 Ton 30'-0" long helical piles per shoring location. Unit price per strut location. Refer to detail "SH-E" on SR-2.2	3	EA	$ _____	$ _____
6	SA	Concrete Strut Swale Infill - Repair Per Detail "SA" on SR-2.4	150	LF	$ _____	$ _____
7	SB	Concrete Strut Swale Removal - Repair Per Detail "SB" on SR-2.4	150	LF	$ _____	$ _____
8	SSR	Concrete Strut Shallow Partial Depth Repair - Includes maximum 4" deep repair per details "SC" and "SD" on SR-2.4	550	SF	$ _____	$ _____
9	DSR	Concrete Strut Deep or Full Reconstruction Repair - Includes repair per details "SC" and "SD" on SR-2.4	100	CU.FT	$ _____	$ _____
10	HAG	Hydro-Active Grouting - Includes injection of leaking concrete cracks and around three (3) roof drains at roof canopy and columns at building main entrance. Refer to detail "HAG" on SR-2.5	1	LS	$ _____	$ _____
11	EI	Epoxy Injection - Includes injection of structural cracks in otherwise sound concrete to be determined on an as-needed basis in the field. Refer to detail "EI" on SR-2.5	20	LF	$ _____	$ _____
12	DPS	New/Replacement Drain Piping System - Includes, 420 LF of pipe, pipe cleanout, all pipe accessories, excavation, sidewalk repairs, tie-in to existing piping, etc. Refer to various repair details on SR-2.5	1	LS	$ _____	$ _____
13	WPC	Waterproofing/Painting Concrete - Includes removal of existing coatings and application of multi-coat waterproofing and painting system. Excludes planter box walls.	1	LS	$ _____	$ _____
14	WLD	Welding of Steel Channel and Tube at Fascia - Includes grinding damaged existing stitch welds, joint prep, and new continuous groove weld. Refer to detail "RRE" on SR-2.3	276	LF	$ _____	$ _____
15	PSF	Paint Steel Fascia - Includes removal of existing coating and application of multi-coat metal coating system	1800	SF	$ _____	$ _____
16	PBS	Planter Box Shrub Removal - Includes removal and disposal of all bushes/shrubs, and roots from within planter boxes. Includes replacement topsoil and grass seed	1	LS	$ _____	$ _____
SUBTOTAL CONTRACTOR'S BASE PROPOSAL						$ _____
CONTRACTOR'S PROJECT BOND PRICE						$ _____
CONTRACTOR'S TOTAL BASE PROPOSAL						$ _____

ITEM	NOTE	ADD/DEDUCT ALTERNATE LINE ITEMS	Estimated Quantity	Unit of Measure	Unit Price	Add(+) or Deduct (-) Price
1	RMC	Polyurethane Roofing Membrane on Flat Concrete Canopy per note 8 on SR-1.2	1	LS	$ _____	$ _____
2	PBA	Remove Planter Boxes along Grid "A" - Includes demo and disposal of concrete planter box walls, new backfill/top soil, and grass seed	9	EA	$ _____	$ _____
3	PBB	Remove Planter Boxes along Grid "E" - Includes demo and disposal of concrete planter box walls, new backfill, gravel. and concrete slab on grade	3	EA	$ _____	$ _____
4	AUF	Alternate Underpinning Footing in Lieu of helical piles in bid item "SHA". Includes any additional excavation and restoration of sidewalks, etc. Refer to detail "AUF" on SR-2.6	5	EA	$ _____	$ _____
5	ASF	Alternate Spread Footing in Lieu of helical piles in bid item "SHE". Includes any additional excavation and restoration of sidewalks, etc. Refer to detail "ASF" on SR-2.6	3	EA	$ _____	$ _____

END OF SECTION

SECTION 00 7300 – SUPPLEMENTAL CONDITIONS

1.0 GENERAL: The Maryland Department of General Services – “General Conditions for Construction Projects” is supplemented by this Section.

2.0 LAYING OUT WORK: Contractor shall, immediately upon entering project site for purpose of beginning work, lay out his own work and be responsible for all lines, elevations and measurements of the building that pertain to the work executed under this contract. He shall exercise proper precaution to verify figures shown on drawings before laying out work and will be held responsible for any error resulting from his failure to exercise such precaution. Contractor shall lay out and be responsible for all lines, elevations and measurements required for proper execution of his work. Report errors or inconsistencies to the A/E before commencing work involved.

A. All existing utilities shall be located and identified by the Contractor – Miss Utility or private locator shall be hired as required.

3.0 MEASUREMENTS: Before ordering any material or doing any work, the contractor shall verify all measurements at the building and shall be responsible for same. No extra charge or compensation will be allowed on account of difference between actual dimensions and the measurements indicated on the drawings; and difference which may be found shall be submitted to the A/E for consideration before proceeding with the work. At his own expense, the contractor shall repair any and all damage to Owner property caused by the contractor, whether or not the damage was caused by a negligent act or normal construction operations.

4.0 PROJECT LIMIT LINES

A. Contractor will be working in and around a school facility that will remain accessible to both the Owner and students. No interruption to the normal building operations will be accepted

B. Arrangements to modify project limit lines shall be made through the Owner's representative.

5.0 TEMPORARY SCAFFOLDS, STAGING, SAFETY DEVICES AND BARRICADES

A. Provide, erect, maintain and remove when directed, all scaffolding, staging, platforms, temporary runways, temporary flooring, guard railings, stairs, etc., as required by local codes or laws for the protection of the workmen and the public.

B. The construction and maintenance of the above items shall comply with all applicable safety codes and regulations.

C. The contractor shall allow the A/E access to this equipment and sufficient time within his scope of work to perform all necessary inspections.

D. Refer to Section 01 5000 – Temporary Facilities and Control for additional requirements.

6.0 LIFTING DEVICES AND HOISTING FACILITIES

A. Contractor shall provide all cranes, hoists, towers, lifting, and conveying devices necessary for the proper and efficient movement of materials; provide operating personnel for equipment as required.

B. Equipment shall be provided with safety devices as required by local codes.

C. Refer to Section 01 5000 – Temporary Facilities and Control for additional requirements.

7.0 ADDITIONS AND ALTERATION AND REPAIRS

A. Remove, cut, alter, replace, patch and repair existing work as necessary to execute the work herein specified. Except as herein specified or shown, do not cut, alter or remove any structural work.
   1. All existing walls, ceilings, mechanical, electrical, plumbing, piping, etc. that will be disturbed or must be removed to complete the required new work, shall be brought to the attention of the OWNER & A/E ASAP.
   2. Existing work, to be repaired or replaced, that is found to be excessively defective, in any way, shall be reported to the A/E before it is disturbed.
   3. Materials and workmanship used in restoring work shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

B. Upon completion of the contract, deliver work complete and undamaged. Damage that may be caused by the Contractor or his workmen to existing portions of the structure, grounds and utilities or work done by others shall be repaired by the Contractor and left in as good condition as existing prior to the damage.
   1. Contractor to make Owner aware of any damage done by Contractor prior to restoring.
   2. At his own expense, the Contractor shall immediately restore to service and repair any damage he may cause to existing piping and conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (except telephone) which are existing on the premises.

C. Protection: Provide the following protective measures:
   1. Temporary protection against damage for all portions of existing structures and grounds where work is to be done, materials handled, and equipment moved and/or relocated.
   2. Dampen debris to keep down dust and provide temporary dustproof partitions in the existing building where required or as directed by the A/E. Equip barrier partitions with hinged doors for access. All conduits, storm drains, gaps, and openings to blanked off where necessary to prevent damage or clogging from dust or debris.
   3. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.
   4. Protection facilities required for the project include but are not limited to the following: Barricades, warning sings, lights: Comply with recognized standards and code requirements for the erection of substantial, structurally adequate barricades where needed to prevent accidents and losses. Paint with appropriate colors and graphics warning signs to inform personnel at the site and the public of the hazard being protected against. Provide lighting where appropriate and needed, including flashing red or colored lights, where appropriate.
   5. Alternate protection methods or facilities, equivalent to those specified, may be used, subject to acceptance by the Owner’s Representative.

D. Environmental Protection: Provide general protection facilities, conduct construction activities, and enforce strict discipline for personnel on the site in ways and by methods that comply with environmental regulations and that minimize the possibility that air might be contaminated or polluted, or that other undesirable effects might result from the performance of work at the site. Avoid the use of tools and equipment which produce harmful noise. Restrict the use of noise making tools and equipment to hours of use that will minimize noise complaints from persons or firms near the project site.

8.0 GENERAL METHOD AND PROCEDURE

A. The existing facility will be occupied during performance of work. Execute work so as to interfere as little as possible with normal functioning of the facility as a whole. Including

operations of utility service, fire protection systems and any existing equipment, and with work being done by others.

1. Do not store materials and equipment in other than assigned areas.
2. Provide unobstructed access to areas within the building required to remain in operation.
3. Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities, including but not limited to the following:
   a. Building codes, including local requirements for permits, testing and inspection.
   b. Health and Safety Regulations.
   c. Utility Company Regulations and recommendations governing temporary utility services.
   d. Police and Fire Department rules and recommendations.
   e. Police and Rescue Squad recommendations.
   f. Environmental protection regulations governing use of water and energy, and the control of dust, noise, and other nuisances.

9.0 STANDARDS: Comply with the requirements of NFPA Code 241, "Building Construction and Demolition Operations", the ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and the NECA National Joint Guideline NJG-6 "Temporary Job Utilities and Services".

10.0 SUBCONTRACTORS AND MATERIALS: After the submission of bid proposal on this project, the Contractor shall submit to the Owner (if requested), the names of the Subcontractors he proposes to use in the construction work. He shall also name the manufacturer of the main systems he proposes to use. Owner to review list of sub-contractors, will revise, and resubmit to Contractor for use on the project. The Owner and A/E reserve the right to accept or reject the use of any Subcontractors or material systems on the project.

11.0 WARRANTIES: All work of each Contractor shall be guaranteed by that contractor or subcontractor against defects of material or workmanship for TWO YEARS after date of substantial completion, unless longer limits of liability are prescribed by law or specifically noted herein. The two-year guarantee period, as defined above, shall not be decreased by any warranty or guarantee held by a subcontractor on materials or equipment supplied.

A. Contractor shall provide a 5-year manufacturer's labor and material warrantee for typical joint sealant material. A 10-year labor and material warrantee shall be provided for hybrid siliconized polyurethane façade sealants. See Specification Section 07 9200 for further information.

B. Contractor shall provide a 10-year labor and material warrantee for all painted surfaces. See Specification Section 09 9120 for additional information.

12.0 CONSTRUCTION SCHEDULE: The Contractor shall, within 7 days after date of commencement of work prepare and submit via email to the Owner and A/E for approval a practical and feasible schedule shown the order in which the Contractor proposed to carry on the work, the date on which he will start the several salient features (including procurement of materials, plant and equipment) and the contemplated dates for starting each phase. The schedules shall be in the form of a progress chart of suitable scale to indicate approximately the percentage of work scheduled for completion at any time. The Contractor shall enter on the chart the actual progress at such intervals as directed by the A/E. See Specification Section 01 3300 for additional requirements.

13.0 SAMPLES AT JOBSITE: Field Samples shall be full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged. See individual sections for types of samples.

14.0 PROGRESS MEETINGS: Throughout the project, on site or virtual meetings will be held between the Owner, A/E and Contractor to discuss the progress of the work and other outstanding issues.

15.0 TESTS AND TESTING: The Contractor shall pay for all tests and testing required by the contract documents and official regulations. The testing laboratory or company shall be only one of these approved by the A/E.

16.0 TEMPORARY SECURITY: Nothing in these Specifications shall preclude security to premises from nature and people. Therefore, any theft of any equipment left on site or damage to work completed by the Contractor is solely the responsibility of the Contractor.

17.0 EXECUTION, CORRELATION, AND INTENT OF DOCUMENTS: Mention in the specifications or indicate on the drawings of articles, materials, operations, or methods requires Contractor to furnish and install each article of material mentioned or indicated; to perform each operation called for, according to method or condition prescribed. In case of any conflict or inconsistency between drawings and specifications, the A/E's decision shall govern. Anything mentioned in the specifications and not shown on the drawings, and anything mentioned in the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between small- and large-scale drawings, the larger scale drawings shall govern.

18.0 AS-BUILT RECORD DRAWINGS: Contractor shall maintain on the job, in good order, a complete set of black and white prints of all A/E drawings for the purpose of recording all changes made to the drawings during the entire job operation. All work completed shall be recorded and kept up to date at all times as the work progresses, and changes occur. All changes shall be recorded in "Red" ink, regardless of who originates or causes the change to be made.

19.0 SPECIFICATIONS EXPLANATION

A. For convenience of reference and to facilitate letting of subcontracts, these specifications are separated into Title Sections. In the case of any questions regarding segregation of tasks, as enumerated in the Instruction to Bidders, they shall be decided by the A/E, prior to receipt of bids.

B. The Contractor shall be solely responsible for segregation of the work of various trades.

C. The specifications are written in the form of a directive to the Contractor, using imperative statements.

D. For brevity and to avoid repetition, such phrases as "the Contractor shall" are intentionally omitted; omitted words or phrases shall be supplied by inference.

E. Insert "conform to" before each reference to a standard specification under (such as ASTM); see STANDARD SPECIFICATIONS with their abbreviations.

F. "Exposed" means "showing in any way or all parts at completion of work under this contract."

G. "Where shown", "as shown" or "where indicated" refers to the drawings, details, and contract.

H. “Approval” "approved", "selected", "directed" and "authorized" means "by the A/E" unless specified otherwise.

I. "Excludes" (headings under SCOPE) "means from this section (only)".

J. It is intended that the work described in each Section of the specification includes the furnishing of all materials, labor, equipment, plant, tools, services and appliances and performing all

operations in connection with the repair and/or replacement of defective portions of the existing construction and replacement of defective portions of the existing construction and any upgrading thereof, complete, as shown in the drawings and/or specified, subject to the GENERAL CONDITIONS, SPECIAL CONDITIONS and terms of the CONTRACT. Where SPECIAL CONDITIONS conflict with GENERAL CONDITIONS, the former shall govern.

20.0 COMPLETION OF WORK

A. Complete the entire work in every respect on or before the date stipulated in the contract.

B. If it is required (in order to complete the work properly) to work portions of this project after regular working hours, such work shall be performed without additional cost to the Owner. Obtain permission from the Owner's representative prior to working these extended hours.

C. If, at any time, in the judgement of the Owner, any item of work is being so unreasonably delayed as to interfere with progress of other dependent work, a reasonable request for additional staffing may be ordered by the Owner, at the Contractors expense.

21.0 TEMPORARY SIGNS

A. Allow no sign or advertisement to be displayed without Owner approval.

B. Owner shall approve design, contents, color, lettering, size, and location of any sign permitted.

22.0 TEMPORARY OFFICE AND TELEPHONES

A. Offices:
   1. The Contractor may set up a small shed at a location pre-approved by the Owner.
   2. Do not use office for storage of materials, tools, or equipment (except that used in engineering layout work). Hazardous materials may not be stored on this site.
   3. Maintain complete and current set of contract documents, correspondence, shop drawings, samples, color schedule and other data pertinent to project construction.

23.0 CONCEALED WORK

A. Before performing any work such as installation of new mortar or concrete over an existing concrete surface which will conceal reinforcing steel that has been cleaned and coated or supplemented after cleaning and coating, secure observation, and review from Owner's representative.

24.0 FINAL INSPECTION

A. A/E’s Final Inspection:
   1. Upon substantial completion of the project, "punch list" inspection will be made by the A/E.
   2. Complete corrections within each time limitation.
   3. A/E will begin inspection on formal notification in writing from the Contractor that project is complete, and that the Contractor had checked the project thoroughly.

25.0 OWNER’S ACCEPTANCE

A. Upon completion and prior to acceptance by Owner, obtain and forward to the A/E, certifications that construction has been completed in accordance with all local and state codes, building and otherwise.

B. Final payment, including entire retained percentage proportional to each phase, shall not be due Contractor until project and all "punch list" items have been completed and approved by Owner, and all warranties and as-built records have been furnished.

26.0 COOPERATION WITH GOVERNMENT DEPARTMENTS, PUBLIC UTILITIES, ETC.

A. Be responsible for making all necessary arrangements with governmental departments, public utilities, public areas, service companies and corporations owning or controlling roadways, water, sewer, gas, electrical, telephone, and telegraph facilities such as pavements, piping, wires, cables, conduits, poles, guys, etc., including incidental structures connected therewith, that are encountered in the work in order that such items may be properly shored, supported, protected, or relocated.

B. Give all proper notices, comply with requirements of such parties in the performance of work, permit entrance of such parties on the project in order that they may perform their necessary work, and pay all charges and fees made by such parties for this work.

C. It is understood that the Contractor will have no claim whatsoever against the Owner for any delay caused him/her during the construction of this project due to work being done by such parties.

27.0 CONDUCT OF OPERATIONS: During the life of this contract, at all times conduct operations at the site and at the access to the site in such a manner so as not to endanger, inconvenience or interfere with the occupants of this or adjoining properties. This includes all trucking operations and the parking of workmen's automobiles.

28.0 SAFETY: The elimination of hazards, the consideration of safety and protection of life and limb in the conduct of this project is of the foremost importance. Contractor to submit safety program for approval within seven (7) days of notice to proceed.

29.0 SITE CONDUCT: No radios/music or smoking. No obscenity (verbal or written on clothing). An overall neat appearance and gentlemen-lady-like demeanor will be expected at all times.

END OF SECTION

SECTION 01 1100 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 PROJECT DESCRIPTION

A. This project is primarily a Structural and Waterproofing restoration endeavor. The Work generally consists of the following scope.
   1. Structural repair of deteriorated exterior concrete roof framing members.
   2. Temporary shoring for selective demolition of deteriorated concrete structural members. Temporary shoring work involves earthwork operations, alterations to exterior building cladding, and other work as required to maintain structural stability. The final design of temporary shoring shall be the responsibility of the contractor and his/her retained structural engineer “Construction Engineer”.
   3. Protection of exterior concrete and metals with waterproofing and other coatings.
   4. Alterations and repair to primary roof drainage to below grade stormwater piping.
   5. Protection of and restoration of site conditions such as sidewalks, planter boxes, topsoil/grass, etc.
   6. Installation of continuous construction barrier around areas of work, subject to Owner and statutory requirements, while maintaining building egress and safe occupancy.
   7. Other work as defined in the contract documents and these specifications.

1.2 WORK SEQUENCE

A. The Work will be conducted in phases to provide the least possible interference to the occupants of the building who will continue to occupy the gymnasium. A detailed schedule shall be submitted and approved prior to commencement of the work.

1.3 OWNER OCCUPANCY

A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.

1.4 CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have limited use of the premises for construction operations, including use of the site. The Contractor shall allow for safe Owner occupancy and safe use by the public.
   1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
   2. Keep driveways and entrances serving the premises clear and available to the Owner and all other occupants at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
   3. Provide written plan of protection of premises outside of the limit of disturbance. Provide graphics and schedules as required to indicate the type of protection utilized and the phasing of the protection.
   4. Before work begins, the Contractor shall videotape/photograph and document all site conditions such as exterior sidewalks, landscaping, roofing, etc., and interior surfaces that might be construed as having been damaged by the Work.

B. Waste Materials: Remove all waste material from the site daily. Long term storage of waste on site is prohibited.

C. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION

SECTION 01 2200 – UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Bid form Section 00 4100

B. Unit Prices Section 01 2200

C. Department of General Services – General Conditions for Construction Projects

D. Department of General Services – Instructions to Bidders for Construction Projects

1.2 SUMMARY: This Section specifies administrative and procedural requirements for unit prices.

A. A unit price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased.

B. Refer to individual Specification Sections for construction activities requiring the establishment of unit prices.

C. Final contract sum for the items covered by unit prices shall be based on actual quantities properly installed by the Contractor and found acceptable to the Owner and his/her A/E. Actual quantities shall be measured collectively by the Contractor and Owner after the work has been accepted by the A/E.

D. For invoicing purposes, all unit price items shall be invoiced in 0.5 square foot (SF) or 0.5 linear foot (LF) increments. The minimum unit for any repair shall be 1 SF or 1 LF.

E. Follow all other requirements described in the Department of General Services – General Conditions for Construction Projects.

1.3 Schedule: A "Unit Price Schedule" is included in Specification Section 00 4100 - "Bid Form". Specification Sections referenced in the Schedule contain requirements for materials and methods described under each unit price.

A. The Owner reserves the right to reject the Contractor's measurement of work in place that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 2300 – ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Bid form Section 00 4100

B. Department of General Services – General Conditions for Construction Projects

C. Department of General Services – Instructions to Bidders for Construction Projects

1.2 SUMMARY: This Section includes administrative and procedural requirements governing Alternates.

A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

B. The cost or credit for each unit price alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

C. The Alternates are not indicated in any particular order of importance and the Owner reserves the right to accept none, one or more of the Alternates at their sole discretion.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.
   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

B. Notification: Immediately following the award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate whether alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other Work of this Contract.

D. Schedule: A "Schedule of Alternates" is included in the bid form enclosed in specification section 00 4100. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

E. Follow all requirements contained within the Department of General Services – Instructions to Bidders for Construction Projects.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 3100 – PROJECT MANAGEMENT & COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General coordination procedures.
   2. Coordination drawings.
   3. RFIs.
   4. Project meetings.

1.3 DEFINITIONS

A. RFI: Request for Information. Request from Owner, A/E, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor's construction schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.

5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. A/E will return without response those RFIs submitted to A/E by other entities controlled by Contractor.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Project number.
   3. Date.
   4. Name of Contractor.
   5. Name of A/E.
   6. RFI number, numbered sequentially.
   7. RFI subject.
   8. Specification Section number and title and related paragraphs, as appropriate.
   9. Drawing number and detail referenced, as appropriate.
   10. Field dimensions and conditions, as appropriate.
   11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   12. Contractor's signature.
   13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to A/E.

D. A/E's Action: A/E will review each RFI, determine action required, and respond. Allow seven working days for A/E's response for each RFI. RFIs received by A/E after 1:00 p.m. will be considered as received the following working day.
   1. The following Contractor-generated RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.
      c. Requests for approval of Contractor's means and methods.
      d. Requests for coordination information already indicated in the Contract Documents.
      e. Requests for adjustments in the Contract Time or the Contract Sum.
      f. Requests for interpretation of A/E's actions on submittals.
      g. Incomplete RFIs or inaccurately prepared RFIs.
   2. A/E's action may include a request for additional information, in which case A/E's time for response will date from time of receipt by A/E of additional information.
   3. A/E's action on RFIs that may result in a significant change to the Contract Time, or the Contract Sum may be eligible for Contractor to submit Change Proposal according to the applicable Contract Forms.
      a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify A/E in writing within 7 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Software log with not less than the following:
   1. Project name.
   2. Name and address of Contractor.
   3. Name and address of A/E.
   4. RFI number including RFI's that were returned without action or withdrawn.
   5. RFI description.
   6. Date the RFI was submitted.
   7. Date A/E's response was received.

F. On receipt of A/E's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify A/E within seven days if Contractor disagrees with response.

1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Web-Based Project Software: Provide, administer, and use web-based Project software site for purposes of hosting and managing Project communication and documentation until Final Completion.
   1. Web-based Project software site includes, at a minimum, the following features:
      a. Compilation of Project data, including Contractor, subcontractors, A/E, A/E's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
      b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
      c. Document workflow planning, allowing customization of workflow between project entities.
      d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
      e. Track status of each Project communication in real time, and log time and date when responses are provided.
      f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
      g. Processing and tracking of payment applications.
      h. Processing and tracking of contract modifications.
      i. Creating and distributing meeting minutes.
      j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
      k. Management of construction progress photographs.
   2. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to A/E. Provide data in locked format to prevent further changes.

B. PDF Document Preparation: Where PDFs are required to be submitted to A/E, prepare as follows:
   1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
   2. Name file with submittal number or other unique identifier, including revision identifier.
   3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and A/E, but no later than 15 days after execution of the Agreement.
   1. Attendees: Authorized representatives of Owner, A/E, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
   2. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Responsibilities and personnel assignments.
      b. Tentative construction schedule.
      c. Critical work sequencing and long lead items.
      d. Designation of key personnel and their duties.
      e. Lines of communications.
      f. Use of web-based Project software.
      g. Procedures for processing field decisions and Change Orders.
      h. Procedures for RFIs.
      i. Procedures for testing and inspecting.
      j. Procedures for processing Applications for Payment.
      k. Distribution of the Contract Documents.
      l. Submittal procedures.
      m. Preparation of Record Documents.
      n. Use of the premises.
      o. Work restrictions.
      p. Working hours.
      q. Responsibility for temporary facilities and controls.
      r. Procedures for moisture and mold control.
      s. Procedures for disruptions and shutdowns.
      t. Construction waste management and recycling.
      u. Parking availability.
      v. Office, work, and storage areas.
      w. Equipment deliveries and priorities.
      x. First aid.
      y. Security.
      z. Progress cleaning.
   3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
   1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise A/E of scheduled meeting dates.
   2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
      a. Contract Documents.
      b. Options.
      c. Related RFI’s.
      d. Related Change Orders
      e. Purchases.
      f. Deliveries.
      g. Submittals.

h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Entity responsible for conducting the meeting will record and distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals.
1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and A/E, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      1) Review schedule for next period.
   b. Review present and future needs of each entity present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site use.
      8) Temporary facilities and controls.
      9) Progress cleaning.
      10) Quality and work standards.
      11) Status of correction of deficient items.
      12) Field observations.

13) Status of RFI's.
14) Status of Proposal Requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 3300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY: This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including Contractor's construction schedule; Submittal schedule; Daily construction reports; Shop Drawings; Product Data; Samples.

1.3 ADMINISTRATIVE SUBMITTALS: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include but are not limited to: Permits; Applications for payment; Performance and payment bonds; Insurance certificates; List of Subcontractors; and Construction Photographs.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
      a. Submittal schedule shall be transmitted at the same time as the project schedule so both schedules can be coordinated.
      b. Partial submittals shall not be allowed.
      c. Submittals shall be transmitted in chronological order by Specification Section and indicate under which article the submittal being made.
      d. GC must certify by signing that the submittal is in compliance with the documents and no part of the submittal constitutes a substitution.
   3. The A/E reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
   1. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The A/E will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
   2. If an intermediate submittal is necessary, process the same as the initial submittal. Allow two weeks for reprocessing each submittal. No extension of Contract Time will be authorized because of failure to transmit submittals to the A/E sufficiently in advance of the Work to permit processing.

C. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
   1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken. Include the following information on the label for processing and recording action taken: Project name; Date; Name and address of A/E; Name and address of Contractor; Name

and address of subcontractor; Name and address of supplier; Name of manufacturer; Number and title of appropriate Specification Section; Drawing number and detail references, as appropriate.

D. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to A/E using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
   1. On the transmittal record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar Chart Schedule: Prepare a fully developed, horizontal bar chart type Contractor's construction schedule. Submit within 30 days of the date established for "Commencement of the Work".
   1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
   2. Within each time bar indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
   3. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
   4. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.
   5. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Engineer's procedures necessary for certification of Substantial Completion.

B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.

C. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.

D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.

E. Cost Correlation: At the head of the schedule, provide a two-item cost correlation line, indicating "precalculated" and "actual" costs. On the line show dollar volume of Work performed as of the dates used for preparation of payment requests.

F. Distribution: Following response to the initial submittal, email copies to the A/E, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

G. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 LOG SUBMITTALS

A. Daily Logs: Contractor shall submit daily logs on a weekly basis which describe tasks performed each day, including documenting hours of manpower on-site. Document safety meetings and any other information as requested by Owner.

B. Delay Logs: Contractor shall submit delay logs on a weekly basis, which list hours of delay per day with total for the week. Tasks shall be identified as being affected by delays. Contractor shall note why labor could not be shifted to other tasks in order to remain on schedule. The Owner reserves the right to dispute and reject delays not properly accounted for or those as a result of mismanagement of manpower. Time lost as a result of the contractor shall be made up by increasing manhours or performing work outside of typical hours and/or days.

1.7 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.

B. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.

C. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information: Scheduled date for the first submittal; Related Section number; Submittal category; Name of subcontractor; Description of the part of the Work covered; Scheduled date for resubmittal; Scheduled date the A/E final release or approval.

D. Distribution: Following response to initial submittal, distribute PDF copies to the A/E, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

E. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.8 MONTHLY REQUESTS FOR PAYMENTS (“PAY APPS”)

A. In addition to all other contract requirements for requisitions, the Contractor shall be required to submit the following documents with each request for payment to the Owner and A/E. Payment applications may not be processed until documents have been received and approved.
   1. Progress as-built plans and sketches. Plans and sketches shall have all repair work accurately located on CAD, PDF, or clearly hand-written pages. All repairs shall have patch

log numbers indicated. Final as-builts to be submitted at the close of the project shall only be that created with to-scale CAD or PDF plans.

2. Progress patch log(s). 8 ½" x 11" Patch log sheets shall correlate accurately with progress as-built drawings and sketches, and at a minimum each patch number shall be tabulated with:
   a. As-built drawing or sketch number
   b. Level and location on structure
   c. Length, width, and area
   d. Phase # where repair patch was performed
   e. Date of which patch was completed
   f. Invoice # for which patch is requested for payment
   g. Any additional notes requested by A/E
3. Additional items to be provided on each patch log sheet:
   a. Each sheet of patch logs shall be of one (1) repair item. Do not mix line items on a single patch log sheet.
   b. Quantities shall be totaled at the bottom of each sheet.
   c. Indicate date log was prepared
   d. Contractor name and/or logo
   e. Job name and number
   f. Project manager
   g. Superintendent in-charge of documenting field quantities
4. Updated phasing and traffic control plans. Plans shall document those actually performed and also those proposed for modification.
5. Project quantity projections. Provide spreadsheet document based on project bid-form, that provides the following information, at a minimum.
   a. Contract quantities, unit costs, and total price for each line item.
   b. Projected quantities and prices for each line item, which accounts for all approved change orders, completed approved repairs, and approved in-progress sounding mark-ups to-date.
   c. Summation of all line items.
   d. Break projections down by phase, if requested.
6. Updated construction schedule.

1.9 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the A/E and Owner's Agent at weekly intervals: List of subcontractors at the site; Approximate count of personnel at the site; High and low temperatures, general weather conditions; Accidents and unusual events; Meetings and significant decisions; Stoppages, delays, shortages, losses; Meter readings and similar recordings; Emergency procedures; Orders and requests of governing authorities; Change Orders received, implemented; Services connected, disconnected; Equipment or system tests and startups; Partial Completions, occupancies; Substantial Completions authorized.

1.10 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information: Dimensions; Identification of products and materials included; Compliance with specified standards;

Notation of coordination requirements; Notation of dimensions established by field measurement.

C. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8 1/2" x 11" but no larger than 24" x 36".

D. Submittal: Submit all submittals as PDF electronic files for the A/E's review.
   1. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.11 CONSTRUCTION PHOTOGRAPHY

A. Procure services of competent photographer to take digital photographs of each area of the site prior to starting construction operations, photographs of construction in each area where work is underway, on or about the first day of each month until work is complete. angle of views: The angle of views of the photographs are subject to direction of A/E. Progress photographs must be submitted as a part of each month's requisition of payment, until substantial completion.

B. Within seven days of photographing, furnish digital jpg images on a CD/DVD or providing a link to OneDrive or other cloud storage device. Identify each image with the following data: (1) Project Title; (2) Name of A/E; (3) Name of Contractor; (4) Date of Photograph; (5) Brief Description of View.

C. Images: JPG images remain the property of the Owner and may be used for exhibition, reproduction, or any other use of the Owner's discretion without additional compensation to Contractor or Photographer.

1.12 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing in diagrams and templates, and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information: Manufacturer's printed recommendations; Compliance with recognized trade association standards; Compliance with recognized testing agency standards; Application of testing agency labels and seals; Notation of dimensions verified by field measurement; Notation of coordination requirements.
   1. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

C. Submittals: Submit color PDFs of each required submittal. The A/E will return the submittal marked with action taken and corrections or modifications required.

D. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
   1. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
   2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.13 A/E'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return are required or requested, the A/E will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The A/E will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
   1. Final Unrestricted Release: Where submittals are marked "No Exception Taken." That part of the Work covered by the submittal may proceed, provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
   2. Final-But-Restricted Release: When submittals are marked "Make Corrections Noted" that part of the Work covered by the submittal may proceed, provided it complies with notations or corrections on the submittal and requirement of the Contract Documents; final acceptance will depend on that compliance.
   3. Returned for Resubmittal: When submittal is marked "Rejected" or "Revise and Resubmit" do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revised or prepare a new submittal in accordance with the notations, resubmit without delay. Repeat if necessary to obtain a different action mark.
      a. Do not permit submittal marked "Rejected" or "Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION

SECTION 01 4000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for quality control services.

B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the A/E.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

E. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.

F. Inspections, test, and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

G. Requirements for the Contractor to provide quality control services required by the A/E, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 RESPONSIBILITIES

A. Contractor Responsibilities: The Contractor shall provide inspections, tests, and similar quality control services, specified in individual Specification Sections, and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.
   1. All required material testing including but not limited to concrete cylinders and slump cone testing shall be completed by a qualified testing agency hired and paid for by the Contractor. Refer to each specification section for various types of testing required. The Owner will not be responsible for any testing services for this project.
   2. All project geotechnical engineering inspections including by not limited to earth backfill, the installation of excavation support system, and the installation of drilled helical piles shall be completed by a registered geotechnical engineering firm hired and paid for by the Contractor.

B. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract

Document requirements, regardless of whether the original test was the Contractor's responsibility.

1. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.

C. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
   1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
   2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
   3. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
   4. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
   5. Security and protection of samples and test equipment at the Project site.

D. Owner Responsibilities: The Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility.
   1. General structural inspections shall be completed by the A/E, Morabito Consultants, Inc., under its present contract with the Owner.

E. Duties of the Testing Agency: The independent testing agency engaged to perform sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the A/E and Contractor in performance of its duties and shall provide qualified personnel to perform required inspections and tests.
   1. The agency shall notify the A/E and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work. The agency shall not perform any duties of the Contractor.

F. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to provide required services with a minimum of delay. In addition, the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
   1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.4 SUBMITTALS

A. The independent testing agency shall submit a certified written report of each inspection, test, or similar service, to the Engineer, in PDF format via email. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

B. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
   1. Date of issue; Project title and number; Name, address, and telephone number of testing agency; Dates and locations of samples and tests or inspections.
   2. Names of individuals making the inspection or test; Designation of the Work and test method; Identification of product and Specification Section; Complete inspection or test

data; Test results and an interpretations of test results; Ambient conditions at the time of sample taking and testing.

3. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
4. Name and signature of laboratory inspector; Recommendations on retesting.

1.5 QUALITY ASSURANCE

A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

3.2 General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."

3.3 Protect construction exposed by or for quality control service activities and protect repaired construction.

3.4 Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION

SECTION 01 5000 – TEMPORARY FACILITIES & CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security, and protection.

B. Temporary utilities required include but are not limited to:
   1. Coordination of power outage with owner.
   2. Water service and distribution.
   3. Temporary electric power and light.

C. Temporary construction and support facilities required include but are not limited to:
   1. Field offices and storage sheds within contract limits.
   2. Sanitary facilities, including drinking water.
   3. Temporary enclosures.
   4. Temporary elevator use.
   5. Temporary project identification signs and bulletin boards.
   6. Waste disposal services.
   7. Rodent and pest control.
   8. Building access equipment and structures such as scaffolds, suspended scaffolds (swing stages), tie-back anchors, etc.
   9. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities required include but are not limited to:
   1. Security badges for all personnel.
   2. Temporary fire protection.
   3. Barricades, warning signs, lights.
   4. Environmental protection.

1.3 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
   1. Building code requirements
   2. Health and safety requirements.
   3. Utility company regulations
   4. Police, Fire Department and Rescue Squad rules.
   5. Environmental protection regulations.

B. Standards:
   1. Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library “Temporary Electrical Facilities."
   2. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

3. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
4. Occupational Safety and Health Administration (OSHA) Safety and Health Regulations for Construction 29 CFR Standard 1926.
5. OSHA 1910, Subpart D, Walking and Work Surfaces.
   a. OSHA 1910.23 - Guarding floor and wall openings and holes.
   b. OSHA 1910.27 - Scaffolds and rope descent systems.
6. OSHA 1910, Subpart F, Appendix C, Personal Fall Arrest Systems.
   a. OSHA 1910.66 - Powered Platforms for Building Maintenance
   b. OSHA 1910.66 - Guidelines (Advisory)
   c. OSHA 1910.66 - Exhibits (Advisory)
7. OSHA Ruling on Window Cleaning by Bosun's Chair.
8. OSHA 1910.66 Subpart F, Powered Platforms.
9. OSHA 1926 Subpart L - Scaffolds.
10. OSHA 1926 Subpart M, Fall Protection.

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.4 PROJECT CONDITIONS

A. Contractor Parking: Limited parking will be made available to the contractor to be mutually agreed upon with owner facilities management.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on the site. Know that other areas of the project may have other tenants which will remain in operation.

C. Coordination: On a daily basis, coordination of outages, utilities access, security, etc. to be coordinated with the appropriate Owner personnel.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials; if acceptable to the A/E, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.
   1. For job-built temporary offices, shops, and sheds within the construction area, provide UL labeled, fire treated lumber and plywood for framing, sheathing and siding.
   2. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.
   3. For fences and vision barriers, provide exterior type, minimum 3/8" thick plywood.
   4. For safety barriers, sidewalk bridges and similar uses, provide minimum 5/8" thick exterior plywood.

B. Gypsum Wallboard: Provide gypsum wallboard complying with requirements of ASTM C36 on temporary interior walls.

C. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.

2.2 EQUIPMENT

A. General: Provide new equipment; if acceptable to the A/E, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

B. Electrical Outlets: Where existing is not available or adequate, provide portable generators at no cost to the Owner. Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher-voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

C. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress.

D. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required or adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures, where exposed to moisture.

E. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed, if required.

F. Temporary Offices: Utilize a space within the construction limits as deemed acceptable to the Owner’s representative.

G. Temporary Toilet Units: Provide portable toilet units and maintain in sanitary condition satisfactory to the Maryland Health Department.

H. First Aid Supplies: Comply with governing regulations.

I. Fire Extinguishers: Provide Hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
   1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use, as needed.

B. Sterilization: Sterilize temporary water piping prior to use.

C. Temporary Electric Power Service: The contractor may use the existing electric service if it has adequate capacity. If inadequate capacity exists, the Contractor shall provide portable generators at no cost to the Owner. The contractor is responsible for sequencing.

D. Temporary Lighting: If required to supplement existing, install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.

E. Sewers and Drainage: Existing sewers are available to remove effluent that can be discharged lawfully.
   1. Filter out excessive amounts of construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
   2. Maintain sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

3.3 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Provide incombustible construction for offices, shops and sheds located within the construction area. Comply with requirements of NFPA 241.

B. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

C. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, other construction operations and similar activities.
   1. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction
   2. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.

D. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

E. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days. Lunch garbage to be removed daily. Handle hazardous, dangerous, or unsanitary waste materials separately form other waste by containerizing properly. Dispose of material in a lawful manner.

F. Stairs: Permanent stairs are available. Cover finished permanent stairs with a protective covering where needed to maintain original condition.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the A/E.

B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install, and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for

Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking on the construction site.
4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Coordinate with Owner's security staff for admittance of all personnel.
   1. Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

F. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
   2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the A/E requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of the Contractor.

D. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
   1. Replace air filters and clean inside of ductwork and housings.
   2. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
   3. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.
   4. Clean all deck drains of construction debris to assure free flow of all water.

END OF SECTION

SECTION 01 6000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES: All work incorporated into this project shall conform to the applicable specifications and standards and shall be of the make, type and quality specified.

A. All products shall be specifically suitable for the service intended.

B. Material shall not be used for any purpose other than that for which it is designed.

1.3 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Specific materials for repairs and included in the Technical Sections for these Specifications.

B. Cleaning work is included under Section 01 7400 – “Cleaning & Waste Management”.

1.4 MANUFACTURER’S INSTRUCTION

A. The installation of any component of the work shall comply with the requirements of the manufacturer's printed instructions. Obtain and distribute copies of such instructions to all parties involved in the installation, including two copies to the Agent. Maintain one set of complete instructions at the job site during installation and until completion and acceptance of the work.

B. Handle, mix and install in strict accordance with the manufacturer's printed instructions and in conformity with the specified requirements.
   1. In the event that the job conditions or specified requirements conflict with the manufacturer's printed instructions, consult with the Agent before proceeding with the work.
   2. Do not proceed with the installation until all conflicts have been resolved or without clear instructions.

C. Perform all work in strict accordance with the manufacturer's printed instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by the contract documents.

1.5 TRANSPORTATION AND HANDLING

A. Arrange deliveries of material and equipment in accordance with construction schedules. Coordinate delivery so as to avoid conflict with the work and with conditions at the site.
   1. Upon delivery, inspect all shipments to assure compliance with the requirements of the contract documents and approved submittals, and that the material and equipment that has been delivered is undamaged and properly protected.

B. Identification of products: Materials shall be delivered in unbroken containers and shall bear the manufacturer's name, brand designation or similar marking for convenient field checking. Any such articles which are not easily identifiable or shown indication of possible adulteration will be rejected at the discretion of the agent whose decision shall be final.

C. Provide equipment and personnel to handle the materials by methods which will prevent damage to the products or the packaging.

1.6 STORAGE AND PROTECTION

A. Responsibility for products: Assume full responsibility for materials and equipment, from the time of ordering through delivery and until completion and final acceptance of the finished work. Damage to all such items occurring in this time interval shall be made good to the full satisfaction of the agent and at the contractor's expense.

B. Store materials within the building in strict accordance with the manufacturer's instructions, with seals and labels intact and legible. Store products subject to damage by the elements in weather-tight enclosures. Maintain temperature and humidity within the range required by the manufacturer's instruction.

C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored materials and equipment to assure that they are maintained under specified conditions, free from damage or deterioration.

D. Provide substantial coverings as necessary to protect the installed material and equipment from damage as a result of traffic or subsequent construction operations.

1.7 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Product list: Within 15 days after the award of the contract, submit to the agent a complete list with cut sheet of the products proposed for use in the project. Include the name of the manufacturer and the installing subcontractor.

B. Named products: Base bids on providing the specific materials of the types and/or brands mentioned on the drawings or in the specifications. It is here emphasized that the specifications of products by name is intended to be descriptive of the quality, workmanship, finish, function, and approximate characteristics desired.
   1. For products specified by naming several products or manufacturers, select any one of the products or manufactures named which complies with the specifications.
   2. For products specified by naming only one product and manufacturer, there shall be no option.
   3. For products specified by naming one or more products or manufacturers, followed by the phrase "or equal", the contractor must submit a request for substitution, as hereinafter specified, for any product or manufacturer not specifically named.

C. Contractor's representations: A request for substitution shall constitute a representation that the contractor has investigated the proposed product and has determined that it is equal to or superior in all respects to the product specified and that he will provide the same warranties or bonds as for the specified product. The contractor further represents that he will coordinate the installation of an accepted substitution into the work and make such other changes as may be required to make the work completed in all respects. In making a request for substitution, the contractor shall waive all claims for additional costs, under his responsibility, which may subsequently become apparent.

D. The agent will review request for substitution with reasonable promptness and notify the contractor in writing or the decision to accept or reject the requested substitution.

END OF SECTION

SECTION 01 7300 – EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. General administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.

1.3 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
   1. Structural Elements: When cutting and patching structural elements, notify A/E of locations and details of cutting and await directions from A/E before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
   2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
   3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
   4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in A/E's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

2.2 General: comply with requirements specified in other Sections.
   1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

2.3 In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to A/E for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performances. Record observations.
   1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and condition.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrications schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to A/E according to requirements in Section 01 3100 “Project Management and Coordination.”

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify A/E promptly.

B. General
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish limits on use of Project site.
   3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   4. Inform installers of lines and levels to which they must comply.
   5. Check the location, level and plumb, of every major element as the Work progresses.
   6. Notify A/E when deviations from required lines and levels exceed allowable tolerances.
   7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for referenced by A/E.

3.4 INSTALLATION

A. General: Locate the Work and components of the work accurately, in correct alignment and elevation as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so not part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties' involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachments: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by A/E.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Remove and replace damaged, defective, or non-conforming Work.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performances of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering, and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
   5. Proceed with patching after construction operations requiring cutting are complete.

E. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched area after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched area and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
   3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

F. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
4. Use containers intended for holding waste materials of type to be stored.
5. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site Maintain: Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 7400 “Cleaning and Waste Management.”

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existing at commencement of the Work.

C. Comply with manufacturer's written instruction for temperature and relative humidity.

END OF SECTION

SECTION 01 7400 – CLEANING & WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. Section Includes: The work includes the furnishing of all labor, material, tools, equipment, and services necessary for and reasonably incidental to cleaning work specified.
   1. Maintain the premises and public properties free from accumulations of waste, debris and rubbish caused by construction operations. Keep all areas of the existing building occupied by the Owner or his tenants free from the accumulation of waste material and rubbish, construction droppings and debris.
   2. At the completion of the work, remove all waste materials, rubbish tools, construction equipment, machinery, and surplus material; and clean all exposed surfaces. Restore all disturbed areas to their original condition (including all tenant finishes, equipment, etc.) Leave the project clean and ready for occupancy.
   3. All cleaning must take place during non-peak building hours.

1.3 SAFETY REQUIREMENTS

A. Standards: Maintain the project in accordance with the requirements of the Federal Occupational Safety and Health Act of 1970, and all rules and regulations pursuant to the Act, and in accordance with the requirements of the Building Code.

B. Hazard Control:
   1. Store volatile or flammable waste such as mineral spirits, oil, oily rags, paint rags, paint cans, paint thinner and other potentially hazardous refuse in covered metal containers.
   2. Do not permit the accumulation of waste materials and debris on the premises.

C. Conduct all cleaning and disposal operations in compliance with all local laws and ordinances and anti-pollution laws.
   1. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
   2. Burning or burying of debris, rubbish or other waste materials on the premises will not be permitted.

1.4 INTERNATIONAL GREEN BUILDING CODE (IGCC)

A. Building Site Waste Management Plan: A building site waste management plan shall be developed by the contractor and implemented for excavated soil, rock, and land-clearing debris. Land-clearing debris is limited to stumps and vegetation. Diverted land-clearing debris and removed rock and soil shall not be sent to sites where development activity is prohibited by the governing building code or to greenfields other than those being used for agricultural purposes or being developed as part of a building project.
   1. Not less than 90% of the land-clearing debris, excluding invasive plant materials, shall be diverted from disposal in landfills and incinerators other than waste-to-energy systems with an energy-recovery efficiency rate higher than 60%. Land-clearing debris calculations shall be based on either weight or volume but not both. Receipts or other documentation related to diversion shall be maintained through the course of construction.

2. The Building Site Waste Management Plan shall address all of the following:
   a. Land-clearing debris, rock, and soil to be diverted from disposal by composting, recycling, or reuse.
   b. Waste materials that will be diverted on-site.
   c. The locations to which waste materials will be diverted off-site.
   d. Soils to be stockpiled for future use at any location.
   e. Woody waste to be used as fuel.
   f. The destruction and disposal of invasive plant materials.
   g. The methods of removal of any contaminated soils.
   h. The treatment of vegetation to comply with the rules of government-designated quarantine zones for invasive insect species.

PART 2 - PRODUCTS

2.1 MATERIALS

A. On surfaces to be cleaned, use only the cleaning material or agent recommended by the manufacturer or fabricator of the surface to be cleaned.

B. Do not use cleaning agents on surface other than those recommended by the cleaning agent manufacturer.

PART 3 - EXECUTION

3.1 CLEANING DURING CONSTRUCTION

A. Execute cleaning in such a manner as to ensure that the building, premises, and public and adjacent properties are maintained free from accumulation of debris, waste materials and rubbish. Handle waste materials, debris, and rubbish with as few handlings as possible. Do not drop or throw debris from heights.

B. Provide suitable closed containers, as approved, on site and in sufficient quantity and capacity to provide safe storage of rubbish and debris until disposal.

C. Disposal: At reasonable intervals during the progress of the work, or as directed, clean the site and adjacent public and private properties, and dispose of water materials, debris, and rubbish. Remove waste materials, debris and rubbish from the site and dispose of legally at an approved public, or private dumping areas.

D. Schedule cleaning operations so that dust and other contaminants resulting from cleaning operations do not fall on wet or freshly painted or coated surfaces.

3.2 FINAL CLEANING

A. Prior to substantial completion, inspect all visible interior and exterior surfaces and concealed spaces in so far as practical.

B. Upon completion of the work, remove grease, dust, dirt, stains, labels, spots, marks, fingerprints, smears and foreign materials from visible interior and exterior surfaces. Repair, patch, and touch-up marred surfaces to specify finish and to match adjacent surfaces. Clean and polish all glass; replace any broken glass. Clean all hardware. Clean all exposed bronze, aluminum and stainless steel, interior, and exterior.

END OF SECTION

SECTION 02 4119 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.2 DEFINITIONS

A. Extent of selective demolition work is indicated on drawings.

B. Types of Selective Demolition Work: Demolition requires the selective removal and subsequent off-site disposal of the following:
   1. Portions of the existing concrete structure indicated on drawings and as required to complete the concrete repair operation.
   2. All existing walls, ceilings, mechanical, electrical, plumbing, piping, etc. that will be disturbed or must be removed to complete the required new work, shall be brought to the attention of the OWNER & A/E ASAP.

1.3 SUBMITTALS

A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's Representative for review prior to commencement of work. Include coordination for temporary shut off of utility services as required, together with details for dust and noise control protection.
   1. Provide detailed sequence of demolition and removal work to ensure uninterrupted access to the balance of the building.
   2. Coordinate the construction schedule with Owner's continuing occupation of the building.

1.4 JOB CONDITIONS

A. Occupancy: Owner will be continuously occupying areas of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will severely impact Owner's normal operations.

B. Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.
   1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions of building.
   2. Erect temporary covered passageways as required by authorities having jurisdiction.
   3. Provide shoring, bracing, or support to prevent movement, settlement or collapse of structure or element to be demolished, and adjacent facilities or work to remain. See specification section 31 4100 for further requirements.
   4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
   5. Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
   6. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.

7. Remove projections at completion of work.

C. Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

D. Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
1. Do not close, block, or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

E. Utility Services: Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by owner and authorities having jurisdiction. The Contractor shall notify the Owner ASAP who will provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

F. Environmental Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

G. Building Egress: Do not block under any circumstances.

H. Provide exhaust systems as necessary to assure effective air and water pollution control.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 INSPECTION: Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions of structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.

3.2 PREPARATION

A. Provide shoring, bracing, or support as required to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain. Cease operations and notify the Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

B. Cover and protect furniture, equipment, and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

C. Erect and maintain dust proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
1. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust proof partitions of minimum 4" studs, 5/8" drywall (joints taped) on occupied side, 1/2" fire retardant plywood on demolition side, and fill partition cavity with sound deadening insulation.
2. Provide weatherproof closures for exterior openings resulting from demolition work.

D. Notify Owner that by-pass utility connections are necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shut down of service is necessary.

3.3 DEMOLITION

A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
   1. Demolish concrete and masonry in small sections. Cut concrete and masonry junctures, with construction to remain, using power-driven saw.
   2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
   3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

B. If unanticipated mechanical, electrical, or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.4 REINSTALLED MATERIALS: Where indicated in Drawings as “Reinstalled”, carefully remove indicated items, clean and store in a safe place on site. Coordinate with owner’s representative to find a temporary location to store these rework items which will not overstress the existing structure.

3.5 DISPOSAL OF DEMOLISHED MATERIALS: Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.

3.6 CLEAN-UP AND REPAIR

A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove projections and leave interior floor areas power wash clean.

B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

SECTION 03 0100 – MAINTENANCE OF CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and General Provisions of the Contract, including General and Supplementary Condition and Division 1 Specification Sections apply to this section.

1.2 SUMMARY

A. The Contractor shall furnish all labor, material, accessories, equipment, supervision, and hired services necessary for the proper replacement, protection, and restoration of all deteriorated or otherwise inadequate existing concrete within the project limits.

B. The total scope of concrete repair work for this project is estimated to be the quantities listed on the bid form (Section 00 4100) prepared by the Engineer.

1.3 RELATED WORK

A. Section 02 4119 Selective Demolition

B. Section 03 6410 Moisture-Sensitive Injection Grouting

C. Section 05 0519 Post-Installed Anchors in Concrete & Masonry

D. Section 07 9200 Joint Sealants

E. Section 09 9120 Painting

F. Section 09 9726 Polymerized Cementitious Coatings

G. Section 31 4100 Shoring

1.4 UNIT PRICES

A. The Contractor shall submit unit prices as required on the Bid Proposal Form (Section 00 4100) and section 01 2200 Unit Prices.

1.5 QUALITY ASSURANCE

A. The work shall be performed only by and under the direct supervision of persons experienced in this specialized type of repair.

B. Equipment used shall be specifically suitable for this work without causing undue shock or vibration to the structure.

C. All materials including repair mortars and related products shall be specifically suitable for each use and shall be selected and coordinated to meet the project requirements for each area of repair regarding depth, thickness, bonding characteristics, location, curing time and other conditions affecting the selection of the materials to be used.

D. The concrete repair Contractor shall have a minimum of ten (10) years of experience in major concrete remediation work and shall submit a list of at least five (5) similar projects which document successful performance.

E. The Contractor shall have a minimum of five (5) years of experience in performing epoxy injection work and shall submit a list of at least five (5) projects in which epoxy injection was successfully performed.

1.6 REFERENCED STANDARDS: Conform to and perform work in accordance with the current editions of Local and State Building Codes.

A. ACI – American Concrete Institute
1. ACI 132R – Guide for the Responsibility in Concrete Construction.
2. ACI 211.1 - Recommended Practice for Selecting Proportions/Normal Weight Concrete.
3. ACI 211.5R – Guide for Submittal of Concrete Proportions.
4. ACI 211.9R – Guide to Selecting Proportions for Pumpable Concrete.
5. ACI 214.4R – Guide for Obtaining Cores and Interpreting Compressive Strength Results.
6. ACI 214R – Guide to Evaluation of Strength Test Results of Concrete.
7. ACI 222.2R – Report on Corrosion of Prestressing Steels.
8. ACI 222.3R – Guide to Design and Construction Practices to Mitigate Corrosion of Reinforcement in Concrete Structures.
9. ACI 222R – Guide to Protection of Reinforcing Steel in Concrete against Corrosion.
10. ACI 223R – Guide for the Use of Shrinkage-Compensating Concrete.
11. ACI 224.1R – Causes, Evaluation, and Repair of Cracks in Concrete Structures.
12. ACI 224.3R – Joint in Concrete Construction.
13. ACI 224.4R – Guide to Design Detailing to Mitigate Cracking.
14. ACI 224R – Control of Cracking in Concrete Structures.
15. ACI 237R – Self-Consolidating Concrete.
16. ACI 301 - Specification for Structural Concrete.
17. ACI 304 - Recommended Practice for Measuring, Mixing and Placing Concrete.
18. ACI 304.2R – Guide to Placing Concrete by Pumping Methods.
19. ACI 305.1 – Specification for Hot Weather Concreting.
20. ACI 305R – Guide for Hot Weather Concreting.
21. ACI 306.1 – Standard Specification for Cold Weather Concreting.
22. ACI 306R – Guide for Cold Weather Concreting.
23. ACI 308.1 – Specification for Curing Concrete.
24. ACI 308R – Guide to External Curing of Concrete.
25. ACI 311 - Recommended Practice for Concrete Inspection.
26. ACI 315, CRSI 63, and CRSI 65 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.
27. ACI 318 - Building Code Requirements for Reinforced Concrete.
28. ACI 347 - Recommended Practice for Concrete Formwork.
29. ACI 503.4 – Standard Specification for Repairing Concrete with Epoxy Mortars.
30. ACI 503.7 – Specification for Crack Repair by Epoxy Injection.
31. ACI 546R – Guide Concrete Repair.
32. ACI 546.2R – Guide to Underwater Repair of Concrete.
33. ACI 546.3R – Guide to Materials Selection for Concrete Repair.
34. ACI 548.14 – Specification for Repairing Concrete with Epoxy Mortar.
35. ACI 562 – Code Requirements for Assessment, Repair and Rehabilitation of Existing Concrete structures.
36. ACI 563 – Specifications for the Repair of Concrete Buildings.
37. ACI 364.12T – Repair of Leaking Cracks in Walls of Liquid Containment Structures
38. ACI 364.12T – Repairs for Reinforcement with Shallow Cover.
39. ACI 364.3T – Treatment of Exposed Epoxy-Coated Reinforcement in Repair.
40. ACI 364.6T – Concrete Removal in Repairs Involving Corroded Reinforcing Steel.
41. ACI 364.7T – Evaluation and Minimization of Microcracking in Concrete Repair.

42. ACI 364.9T – Cracks in a Repair.

B. ASTM International
1. ASTM A 775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
2. ASTM A 884 - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire.
3. ASTM A 1064 - Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
4. ASTM A-767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcing.
5. ASTM A-1060 - Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete.
6. ASTM A-780 - Standard Specification for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings.
7. ASTM C 150 - Portland Cement.
8. ASTM C 157 – Length Change of Hardened Hydraulic Cement Mortar and Concrete
9. ASTM C 596 – Drying Shrinkage of Mortar Containing Portland Cement.
10. ASTM C1116 - Fiber-Reinforced Concrete and Shotcrete.

1.7 SUBMITTALS

A. Action Submittals
1. Mix Designs: All classes of concrete include aggregate gradation and actual proportioning.
2. Manufacturer's Literature: Each material and accessory include manufacturer's directions and product specifications with recommended unit quantities for all items listed within Products and Materials of this section.
3. Certification:
   a. Compliance: Notarized statement issued by manufacturers of the respective products that the supplied products meet requirements and are tested in accordance with standards specified.
   b. Compatibility: Certify that curing compounds, sealers and form release agents will not discolor concrete and without removal from concrete will not be harmful to later application of setting materials.
   c. Installation: Certify that the materials have been installed/applied in accordance with the manufacturer's instructions.
4. Delivery Tickets: Duplicate tickets with each load; stating:
   a. Producer's Name; Delivery Date; Time Dispatched; Time Delivered; Truck Number; Number of Cubic Yards; Type and Brand of Cement; Amount of Admixture; Class of Concrete or Cement Content (Bags/Cubic Yards); Amount of Water Added at Job.
5. Qualifications of inspection agency including past experience of field personnel to perform required inspection.
6. Contractor’s procedures, methods, and materials for controlling the effects from hot and cold weather concreting.
7. Plan for confining, collecting, and disposing of broken concrete and other waste materials as a result of removal operations.
8. Delegated shoring drawings and calculations outlining per Section 31 4100 and additional requirements within this section.

B. Informational Submittals
1. Laboratory and Field Test Reports as described in this section.
2. Inspection Reports: Certifying rebar, fibermesh and weld wire fabric placement, etc.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. The Contractor shall select the means and methods of concrete removal and cleaning so that the specified prepared surface and depths of cuts are obtained, and the structural capacity is not exceeded. The Contractor shall obtain approval from the Engineer as to the type of equipment he intends to use. The following equipment, or an approved equal, may be used on this project.

B. Chipping hammers of nominal 15 lb. class or less shall be used for concrete removal work. Chipping hammers with a total weight not to exceed 30 lbs. may be used if the Contractor demonstrates that the adjacent sound deck concrete is not damaged and that the hammers do not punch through the existing material excessively, as determined by the Engineer. In all cases, final detail chipping shall be completed with 15 lb. hammers maximum.

C. Abrasion-blasting equipment capable of removing rust from the exposed steel and contaminants and laitance from newly exposed concrete surfaces and the surfaces of the structural fill concrete. All steel surfaces shall be cleaned to a near white condition conforming to SSPC 6.
   1. All abrasion media shall contain less than 0.2% free silica.

D. Compressed air equipment capable of the removal of dust and dirt from concrete repair areas. Refer to project general conditions and section 01 7400 for additional information.

2.2 PRODUCTS AND MATERIALS

A. Forms:
   1. Boundary forms shall be rigidly constructed and well braced steel or wood forms, straight and with precise corners. Design to withstand stresses resulting from the casting process.
   2. Formed Concrete Surfaces (ACI 301)
      a. All exposed to view formed concrete finishes shall be as specified in ACI 301, Section 5.3.3.4 Rubbed finishes. Except as otherwise indicated, finish surfaces per Section 5.3.3.4.c Cork-floated finish.
      b. All non-exposed to view formed concrete finishes shall be as specified in ACI 301, Section 5.3.3.3 As-Cast Finishes. Except as otherwise indicated, finish surfaces per Section 5.3.3.3.b Surface finish-2.0 (SF-2.0).
   3. Form tie rods: Use 300 series stainless steel threaded rod for form tie rods to be left embedded.

B. Mild Steel Reinforcement:
   1. Manufacture and deform in accordance with ANSI/ASTM A-615, except all reinforcing to be welded shall conform to ASTM A-706, and all exposed reinforcing shall conform to ASTM A-775/A-767. All bars shall be Grade 60.
   2. Welded wire fabric: ASTM A-884/A-1064/A-1060, Grade 65.
   3. Provide spacers, chairs, bolsters, ties, sleeves, and other devices necessary to properly place, space, support, and maintain reinforcing in locations, fabricated in accordance with ACI 315. No aluminum inserts or accessories will be permitted.
   4. Structural dowels/pins:
      a. #3 diameter epoxy rebar set into existing concrete surface in approved epoxy (2-1/2” minimum embedment). Dowel length to suit repair depth.
      b. 1/4” diameter long stainless steel (Type 304) all-thread set into existing concrete surface in approved epoxy (2-1/2” minimum embedment). Dowel length to suit repair depth.
      c. 1/4” diameter x 5" long Blue Climaseal Tapcon screws by ITW Buildex (2-1/2” minimum embedment).
      d. Or as specifically indicated on plans and details.
   5. Epoxy gel at grouted bolts, rods, and rebar per Spec Section 05 0519.

C. Repair Concrete and Repair Mortar (General Requirements):
   1. Drying Shrinkage Performance:
      a. All concrete, repair mortars, and grout shall their mix designs proportioned to limit drying shrinkage after 28 days to 0.05%. Confirmed via testing completed per ASTM C157. This dry shrinkage limit shall be accomplished primarily by providing the highest aggregate/cement ratio as possible in combination with shrinkage-compensating admixtures. See ready-mix concrete requirements for additional information.
   2. Pre-packaged Bag Mix Concrete & Mortars: The manufacturer(s) shall be required to have available a qualified representative to advise on the use of products for adjustment due to weather or job conditions.
   3. Modifying Admixtures: To accelerate the hardening of the concrete or to produce higher than normal strength at early periods; will not be permitted unless specifically approved. Do not use any admixture which will affect the concrete color. Do not use admixtures without written approval and strict quality control. The admixture manufacturer(s) shall be required to have available a qualified representative to assist in the proportioning and to advise on the use of the product for adjustment due to weather or job conditions.
   4. Air Entraining Admixture: ASTM C 260; Total mix air content 6% ± 1%
   5. Unless otherwise permitted, all ready-mix concrete, pre-mixed concrete, cementitious repair mortar and grout shall contain a corrosion inhibitor which meets or exceeds the following requirements for either set or non-set corrosion inhibitor admixtures:
      a. Non-Set-Accelerating Corrosion Inhibitor:
         1) Manufacturer: Cortec Corporation
         2) Product in Liquid Form: MCI-2005 at 1 pint/ yd^3 or MCI-2005 NS at 1.5 pints/ yd^3
         3) Product in Powder Form: MCI-2006 or MCI-2006 NS at 1 lb/ yd^3
      b. Set-Accelerating Corrosion Inhibitor:
         1) ASTM C494, Type C, containing a minimum of 30% calcium nitrite.
         2) Manufacturer: “DCI” by GCP Applied Technologies or “MasterLife CI 30” by Master Builders Solutions
         3) Rate = 3.0 gals/yd3
   6. The Contractor shall strictly use any specific products identified on the plans and details.

D. Ready Mix Concrete:
   1. Portland Cement: ASTM C-150, Type I - 570 lbs. per cu. yd. Minimum
   2. Sand: ASTM C 33.
   3. Coarse Aggregate: ASTM C404; maximum size of aggregate shall be 0.75” but not more than 1/2 of the clear distance between the rebar, existing concrete surface, and all formwork.
   4. Water: Clean and free from deleterious amounts of acids, alkalis or organic materials.
   5. High Range Water Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G and contain not more than 0.02% chloride ions.
   6. Shrinkage-Reducing Admixture for Ready Mix Concrete (ASTM C494 Type S):
      a. “Masterlife SRA 035” by Master Builders Solutions
      b. “Eclipse 4500” by GCP Applied Technologies
      c. Rate of 2% admixture by mass of cementitious materials in the concrete mix
   7. Water / Cement Ratio W/C = 0.40 maximum
   8. Aggregate / Cement Ratio A/C = 5.5 minimum
   9. Slump: 8” maximum unless otherwise permitted by approved mix design
   10. 5000 psi, 28-day compressive strength minimum unless otherwise noted on plans and details. Ready mix concrete shall be designed to attain 75% of f’c within 4-days after placement (or earlier if requested by the Contractor).
   11. Concrete unit weight: ± 148 pcf

E. Pre-Mixed Concrete:
   1. Manufacturers:
      a. “ProSpec Metro Mix 240 AE” by TCC Materials
      b. “Deck Mix AE” by US Concrete Products

c. “Eucocrete Supreme” by Euclid Chemical
d. “Sikacrete 211” by Sika Corporation (8” max thickness)
e. Or Approved Equal

F. Pre-Mixed High Early Strength Concrete:
1. A fast-setting full-depth concrete mix for use in ramps, drive isle, entrances, and other critical operation areas of this facility.
2. Manufacturers:
a. “HP Concrete Mix” with optional “Deck Mix AE SCC” installed at a ratio of 2-HP to 1-AE SCC by US Concrete Products when increased workability or flow is desired.
b. “Eucocrete” by Euclid Chemical
c. Or Approved Equal

G. Pre-Mixed Self-Consolidating Concrete:
1. Single component, self-consolidating, shrinkage compensated, pumpable concrete containing an integral corrosion inhibitor, and special additives that allow easy placement by hand or pump.
2. SCC concrete shall not be placed in temperatures below 50 degrees F without consideration for reduced early strength gain.
3. Manufacturers:
a. “Deck Mix AE SCC” by US Concrete Products. “HP Concrete Mix” by US Concrete Products may be mixed with AE SCC to balance flowability with strength gain.
b. “RapidSet FPP Concrete Mix” by CTS Cement Manufacturing Corp.
c. “EucoRepair SCC” or “EucoRepair SCC Fast” by Euclid Chemical
d. Or Approved Equal

H. Repair Mortars:
1. Repair mortars shall be a single component low slump, shrinkage compensating concrete with the following properties:
a. Minimum 28-day slant bond strength of 2000 psi per ASTM C-882
2. Horizontal Repair Mortars:
a. “Speed Crete 2028” or “Versaspeed” by Euclid Chemical
b. “US Thin Patch”, by US Concrete Products
c. Or Approved Equal
3. Vertical / Overhead Repair Mortars:
a. “Speed Crete PM” by Euclid Chemical
b. “US Thin Patch V/O” by US Concrete Products
c. Or approved equal.

I. Non-Shrink Grout:
1. Flowable, non-staining, expansive, non-metallic grout that can be placed in plastic through liquid consistency. Minimum 28-day plastic strength of 8,000 psi and fluid strength of 5,500 psi.
a. “US Construction Grout” by US Concrete Products
b. "NS Grout" (Flowable or Fluid Only) or “NC Grout” by Euclid Chemical
c. “MasterFlow 100” by Master Builders Solutions
d. Or approved equal
2. Locations: Grout packing steel plates, precision grouting base plates, and grouting embedded posts, etc.

J. Miscellaneous Metals
1. Plates, Angles, Channels, Bars, and rolled S, M and HP shapes: ASTM A36 - Galvanized.
2. Anchor Bolts: ASTM F-1554, Grade 36, with regular hexagon nuts and carbon steel washers – All Galvanized.
3. High Strength Bolts: ASTM A325 – Galvanized.

4. Welding electrodes: E70XX
5. Hot-Dip Galvanized Finish: For items indicated for galvanizing, apply zinc coating by the hot-dip process, complying with ASTM A 123 or ASTM A 153 as applicable.
6. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight and complying with DOD-P-21035A or SSPC-Paint 20.

K. Bearing Pads/Shims. Provide bearing pads/shims to match existing size, and thickness unless otherwise specified. Provide new bearing pads at locations where no existing pad is found.
   1. Multi-Polymer Rigid Shims: Minimum 1/8” thickness. Provide pre-manufactured (bonded) shim packs where necessary.
      a. Manufacturer: “Korolath” by Landcon Products or “Shimmers” by JVI, Inc.

L. Crack Repair Materials:
   1. High Modulus Structural Injection Epoxy (Non-moving, non-waterproofing):
      a. “Sikadur 35 Hi-Mod LV” or “Sikadur 52” by Sika Corporation.
      b. “Dural 452 LV” by Euclid Chemical
      c. “Masterinject 1500” by Master Builders Solutions
      d. “SpecPoxy 1000” by SpecChem
      e. Or approved equal.
   2. Epoxy Gel over cracks to be injected:
      a. “Sikadur 31" by Sika Corporation
      b. “Dural 452 Gel” by Euclid Chemical
      c. “MasterEmaco ADH 327RS” by Master Builders Solutions
      d. “SpecPoxy 3000” by SpecChem
      e. Or approved equal.
   3. Moisture Sensitive Chemical Grout Injection (Hydro Active Grouting): See Spec Section 03 6410
   4. Elastomeric Joint Sealants: See Spec Section 07 9200

M. Bonding Agents and Rebar Protection:
   1. Protection and Bonding for Reinforcement, Embedded Connection Plates, etc:
      a. “Armatec 110 Epocem” by Sika Corporation
      b. “Duralprep AC” or “CorrVerter” by Euclid Chemical
      c. “HP Bondit III” by US Concrete Products
      d. “ECB Anti-Corrosion” by Conproco Corp.
      e. Or approved equal
   2. Concrete to Concrete Cold Weather Bonding Agent. Shall be used when placement temperatures are anticipated to be less than 40 degrees F.
      a. "Sikadur 32" by Sika Corporation
      b. “SpecPoxy 2000” by SpecChem
      c. "SurePoxy HM Gel" by Kaufman Products, Inc.
      d. Or approved equal
   3. Warm Weather Concrete to Concrete Bonding Agent: “SSD” Presoak existing concrete surface with potable water to a saturated-surface-dry condition or apply one of the following:
      a. “Duralcrete MV” or “Eucoweld 2.0” by Euclid Chemical
      b. "Sikadur 32" by Sika Corporation
      c. “SpecPoxy 2000” by SpecChem
      d. "SurePoxy HM Gel" by Kaufman Products, Inc.
      e. Or approved equal
   4. Cement slurry bond material where directed by the Engineer.
      a. Pre-dampen existing concrete surface prior to installing cement slurry.
      b. Blend 1 part Type 1 Portland cement with 2 parts clean ASTM C33 sand and mix with undiluted “MasterEmaco A660” by Master Builders Solutions. Add only enough MasterEmaco A660 to produce a thick brushable slurry.

1) Alternative to Portland cement and C33 sand, Contractor may use approved dry repair mortar with MasterEmaco A660 as bonding slurry.

c. Concrete patch material must be completed within 10 minutes of installing cement slurry. Do not allow the slurry to dry.

N. Flatwork Finishing Aids. Shall be used during low humidity, high heat, and high wind concrete finishing, or when concrete mix is otherwise more stiff than optimal. Non-Staining, non-debonding, low VOC.
   a. “MasterKure 111” by Master Builders Solutions
   b. “EVAPRE-RTU” by W.R. Meadows
   c. “Eucobar” by The Euclid Chemical Company
   d. “AquaFilm J74RTU” by Dayton Superior
   e. “SikaFilm” by Sika Corporation
   f. Or approved equal

O. Curing Components: For exterior concrete in 40-degree F rising temperatures, maintain continuously damp concrete surfaces with potable water and “Bur-Lene” curing blankets by Max Katz Bag Company, Inc. Otherwise, apply one of the following immediately after final finishing operations. In areas of colored concrete, use a curing compound that is recommended by the manufacturer of the color hardener
   1. Dissipating Resin Curing Compounds ASTM C-309, Type I, Class B (for surfaces to receive coatings or sealers). Power-wash to remove after 28-days:
      a. “Clear Resin Cure J11W” by Dayton Superior
      b. “Kurez DR-VOX or Kurez DR-100” by The Euclid Chemical Co.
      c. “1100-Clear” by W. R. Meadows
      d. Or approved equal

PART 3 - EXECUTION

3.1 CONCRETE REMOVAL

A. Prior to any concrete removal work, the Contractor shall perform the following operations:
   1. Submit his plan for confining, collecting, and disposing of broken concrete and other waste materials as a result of his removal operations.
   2. Temporarily remove or shore plumbing and electrical lines, fixtures, etc. as required. All removed equipment, services, and fixtures shall be reattached at the completion of the work.

B. Areas of unsound concrete on surfaces shall be identified and marked by the Contractor and reviewed by the A/E.

C. Where possible, removal areas shall be rectangular in shape in plain view. Do not feather edges but saw cut edges 3/4" minimum below the concrete surface. Do not damage the reinforcement. For slab edge removal areas where the slab edge is not cracked, sawcut 3/4" minimum deep into the vertical slab edge at the borders of the removal area.

D. Shore the existing concrete structure per the requirements of the contract documents and specification section 31 4100.

E. During the chipping process, care shall be exercised to avoid cracking of the underlying sound concrete or punching through the member. The Contractor shall block-off the area above and below where chipping work is in-progress. Chipping work over occupied areas shall be performed during periods when the occupied area usage is minimal.

F. All existing reinforcing bars shall remain in-place unless removal is directed by the Engineer. Care shall be taken to avoid damaging existing reinforcement.

G. Where portions of reinforcing bars are exposed, the Engineer will determine if the embedded portion of the bar is soundly bonded to the remaining concrete. If, in the Engineer's judgment, the bar is not soundly bonded, the Contractor shall remove concrete around and under the bar for a length as determined by the Engineer. It is anticipated that most bars in removal areas will require detail chipping work to expose the full bar circumference.

H. All fully exposed reinforcing shall be no closer than 3/4", (nor twice the large aggregate size in repair concrete) measured radially, from existing concrete.

I. The newly exposed sound concrete shall be roughened to a minimum 1/4” profile by brush blasting and cleaned by blowing away loose material with a compressed air jet.

J. The Contractor shall determine that all unsound concrete has been removed by sounding the final prepared surfaces prior to the Engineer's inspection.

K. The Engineer shall be allowed a minimum of 24 hours for the inspection of properly prepared concrete surfaces and reinforcement before the scheduled concrete placement. The Contractor shall inspect all prepared concrete surfaces and reinforcement, and complete surface preparation work prior to the Engineer's inspection.

3.2 SURFACE PREPARATION FOR CONCRETE REPAIR INSTALLATION

A. All sound concrete surfaces shall be cleaned by brush blasting to remove surface deterioration and contaminants, such as sealers, oil, grease, rubber, paint, waterproofing, etc.

B. Where the brush blast does not remove all of the surface contamination, the remaining contaminated sound concrete shall be removed with light chipping hammers.

C. The deep brush blast shall be followed by cleaning with a compressed air jet.

D. If prepared surfaces become contaminated after first cleaning, they shall be chipped and/or brush blasted clean again at the Contractor's expense prior to placing the concrete.

E. All equipment is to be operated and maintained in accordance with manufacturer's recommendations.

3.3 REINFORCEMENT CLEANING AND/OR REPLACEMENT

A. Exposed reinforcement shall be thoroughly cleaned by brush blasting to remove all rust and attached concrete and to achieve a near white condition prior to Engineer inspection.

B. Any single reinforcing bar that is damaged, mislocated, fractured or that has lost more than 10% of its original area at any point along the length shall be brought to the attention of the Engineer. Multiple adjacent parallel bars with 5% to 10% section loss will also require the attention of the Engineer. Specific remedial action will be at the direction of the Engineer in the field. The Engineer reserves the right to supersede the above requirements when he/she determines to be warranted based on uncovered existing conditions.

C. Supply and place new reinforcement as required by the contract drawings and specifications and as deemed necessary from field inspection by the Structural Engineer. The Contractor’s unit square foot or cubic foot concrete bid prices shall include replacement or supplementing of up to 100% of existing primary reinforcement sizes and quantities/spacings as indicated on

the repair plans and details. 100% replacement of ties and stirrups shall be assumed to be replaced/supplemented within repair areas.

D. If during removal of unsound concrete, the Contractor encounters existing reinforcing with less than 3/4” cover from the member surface, he shall notify the Engineer.

E. Reinforcement shall be secured in position so as to be unaffected by concreting operations.

F. Coat all portions of expose reinforcing bars with approved primer/bonding agent. Place paper between bars and concrete surface during coating when required by manufacturer.

3.4 INSTALLATION OF REPAIR MORTAR AND PORTLAND CEMENT CONCRETE

A. Contractor shall follow all requirements and recommendations for hot weather concreting per ACI 305.1 and ACI 305R and cold weather concreting per ACI 306.1 and ACI 306R. Diligent care shall be taken during placement and finishing during cold and hot, as well as dry and windy weather. Contractor’s protection means shall follow the pre-approved methods submitted to the Engineer before work begins.

B. At all repair surfaces where sufficient exposed reinforcing does not exist to assure a good bond, install structural dowels/pins at 12” on center each way (2.5” minimum embedment into sound concrete), unless otherwise directed or indicated on plans.

C. At existing concrete surfaces to be repaired shall be cleaned with a compressed air jet. When the ambient and concrete substrate temperature is 40ºF and rising, the existing concrete surface shall be presoaked to a saturated surface dry condition (SSD) with potable water. Surfaces shall be air dried to remove all free moisture from the surface prior to installation of repair materials. When forced drying is necessary, use radiant heaters or gas torches. The use of air jets is not recommended.

D. Patch depths less than 1/2" thick shall be completed using repair mortar mixed and installed without the addition of any coarse aggregate.

E. Patch depths from 1" to 2" shall be completed using repair mortar mixed and installed with the addition of thoroughly washed, dried, round fine pea-gravel aggregate. The maximum coarse aggregate size shall not exceed one-third the minimum patch depth. Deeper repair patches using mortar may be considered on a case-by-case basis, depending on the product used and if any separate lifts are required.

F. Patch depth greater than 2" shall be completed using Portland Cement Concrete (pre-mixed or ready-mixed), unless otherwise permitted. The maximum size of coarse aggregate should not exceed one-quarter of the minimum patch depth. Thinner patches (1-1/2” absolute minimum) may be considered

G. Surfaces shall be finished flush with adjacent concrete surface. Techniques used must be compatible with the materials used. Repair mortars require only light finishing with wood floats and trowels while Portland cement concrete requires the more usual procedure of floating followed by steel troweling. The finished surfaces shall be uniform, dense, smooth planes without dents, sags, or depressions. Surfaces to receive waterproofing membranes, etc. shall have surfaces prepared in accordance with manufacturer(s) requirements.

H. Exterior flatwork with vehicular and pedestrian foot traffic: Provide a broom finish by striating float-finished concrete surface 1⁄16 to 3/32-inch-deep with a stiff-bristled broom, perpendicular to line of traffic where practical.

I. Exterior flatwork: The Contractor shall use an approved finishing aid during floating/troweling in order to mitigate plastic shrinkage in hot, dry, or windy weather. Strictly follow manufacturer's written instructions. Finishing aids do not take the place of proper curing per this specification.

J. Formed Concrete Surfaces (ACI 301)
   1. All exposed to view formed concrete finishes shall be as specified in ACI 301, Section 5.3.3.4 Rubbed finishes. Except as otherwise indicated, finish surfaces per Section 5.3.3.4.c Cork-floated finish.
   2. All non-exposed to view formed concrete finishes shall be as specified in ACI 301, Section 5.3.3.3 As-Cast Finishes. Except as otherwise indicated, finish surfaces per Section 5.3.3.b Surface finish-2.0 (SF-2.0).
   3. Surfaces to receive waterproofing membranes, etc. shall have surfaces prepared in accordance with manufacturer(s) requirements.

K. Installation of High-Early Strength Premixed Concrete (USCP HP / Deck Mix AE SCC)
   1. When using USCP "HP Concrete" mix, the Contractor shall include 1 bag of "Deck mix AE SCC" for every 2 bags of "HP" in order to ensure workability while retaining high-early strengths. For larger drum mixers, the proportions may be doubled to 4-to-2.
   2. Contractor shall verify and provide a letter from the manufacturer approving the proportions of the mix and suitability for the project.
   3. The total water content for the mix shall equal the sum of the water requirements for each bag of concrete. Measure volumes carefully.
      a. With mixer in motion, add half of the total water content required.
      b. Add 1 bag of HP to the mixer and let turn for 30 seconds.
      c. Add second bag of HP to the mixer and let turn for 1 minute.
      d. Add second half of water content and add 1 bag of Deck Mix AE SCC.
      e. Allow mix to turn in the drum for an additional 1 to 2-minutes to allow self-consolidating admixtures to activate.

3.5 CURING OF REPAIR MORTAR AND PORTLAND CEMENT CONCRETE

A. Contractor shall follow all requirements and recommendations for hot weather curing per ACI 305.1 and ACI 305R and cold weather curing per ACI 306.1 and ACI 306R. Diligent care shall be taken to immediately protect and cure concrete after placement and finishing during cold and hot, as well as dry and windy weather. Contractor's protection and curing shall follow the pre-approved methods submitted to the Engineer before work begins.

B. Vertical and overhead areas repaired with repair mortars shall be permitted to air dry when approved by the mortar manufacturer. Waterproof paper or polyethylene sheeting may be used to assist in curing but should be prevented from coming in direct contact with the freshly finished surface.

C. Areas repaired with Portland Cement concrete shall be wet cured wherever possible. Concrete shall be protected against loss of moisture by covering with an approved impervious sheet curing material. When wet curing is not possible, the concrete shall be treated with an approved curing compound immediately after finishing.

D. Unless otherwise permitted by the Engineer, framed concrete shall remain covered and cured for a minimum of seventy-two (72) hours after placement (and) concrete must reach a minimum of 75% f'c prior to ceasing active curing operations. The Engineer reserves the right to require up to 7-days of continuous active curing depending on weather and other project conditions.

E. Only approved Dissipating Resin Curing Compounds shall be used for concrete surfaces to be coated with membranes, paints, corrosion inhibitors, sealers, and other surface treatments.

Powerwashing is required to remove any remaining residue from dissipating curing agents prior to proceeding with coatings work.

3.6 APPLICATION OF WATERPROOFING MEMBRANES, STUCCOS, PAINTS, AND CORROSION INHIBITORS.

A. After all the repaired concrete surfaces have cured for a minimum of 28-days, clean and prepare all surfaces per Division 07 and Division 09 requirements.
   1. The manufacturer(s) of all products to be bonded to new concrete shall be responsible for reviewing and approving application of materials prior to a 28-day curing. The Contractor shall provide a written statement from the manufacturer(s) to the Engineer confirming acceptance of early application.

3.7 CHEMICAL GROUT AND EPOXY INJECTION OF CRACKS

A. The Contractor shall examine the condition of the surfaces into which the grout/epoxy is to be injected. Injection materials and procedures shall be well-suited to the crack sizes and moisture and temperature conditions of the work.

B. The equipment used to inject the grout/epoxy shall perform all of the following:
   1. Automatic proportioning of materials with the mix ratio tolerances set by the manufacturer of the material.
   2. Mix the material automatically and completely in line (batch mixing will not be permitted).
   3. Inject the material under pressures. Do not exceed 300 psi.

C. Prior to installation of the chemical grout, inject all cracks with sufficient water to activate the grout.

D. The cracks shall be sealed on all surfaces with epoxy gel prior to injection and shall contain appropriate injection ports.

E. The Contractor shall clean surfaces of excess epoxy, epoxy gel and injection ports by grinding or other appropriate means so that only the edge thickness of completed epoxied cracks is noticeable. No spray or injection ports shall extend beyond the plane of the surfaces of the situ concrete.

3.8 CLEAN-UP

A. All residue from formwork sealant (foam) and other defects created during construction operation shall be removed.

B. The Contractor shall remove all loose concrete from the site and leave the area power wash clean.

C. Debris shall not be flushed down the existing floor drains. Contractor to clear any drain blockage caused by them. Drains shall be checked for clarity at completion of project.

D. See specification section 01 7400 for further requirements.

3.9 RESPONSIBILITY

A. The Owner has retained the services of Morabito Consultants, Inc. to perform required structural inspections.

B. The Contractor shall hire an experienced testing agency to complete tests for all ready-mix concrete. (ACI 301, Section 1.6.1 and 1.6.2).

C. Approvals: The design mix and/or acceptance of the test reports do not in any way relieve the Contractor of his responsibility to ensure that the strength, slump, and quality of the in-place concrete meets the requirements of the Contract Documents.

D. Rejection: The Owner's representative will have the right to reject concrete which does not meet strength and other requirements of the Contract Documents.

E. Mixing Design: If the strength of any test cylinder or fails to meet the ultimate compressive strength, the Owner's representative shall have the right to require a change in proportions to ensure adequate strengths in the remainder of the project.

F. Additional Testing: Owner's representative shall have the right to require testing of the concrete by coring, loading or other means, or removal of that portion of the construction covered by those tests, all costs of which to be borne by the Contractor.

3.10 CONTRACTOR'S DUTIES: Comply with ACI 301 including but not limited to the following:

A. Batch Plant Samples: If desired by Contractor, or so requested because of known or indicated problems.

B. Storage: Provide suitable storage facilities at the job site for test cylinders.

C. Additional Costs: Pay all costs for coring, drilling, additional testing, remedies, and corrections of work which does not meet strength and other requirements of the Contract Documents and/or if failure to perform required duties. Comply with ACI 301.

D. Other Test Cylinders: For other than compressive strength, such as to determine when forms may be stripped, shall be paid for by the Contractor requesting same.

3.11 TESTING AND INSPECTION

A. All required material testing including but not limited to concrete cylinders and slump cone testing shall be completed by a qualified testing agency hired and paid for by the Contractor.

B. Field and laboratory testing of poured in place concrete shall comply with the testing requirements of Section 01400, Quality Control. Perform specified tests and testing in accordance with ACI 301, and ACI 311. Testing Agency shall meet the requirements of ASTM E 329:

C. Slump Tests: Consistency shall be determined at the project site by means of slump test in accordance with C 143. Results of slump test shall appear on the test reports. Slump tests shall be made at the same time as test cylinders are made and when so directed by the Structural Engineer.

D. Compression Tests: Each test consists of eight (8) concrete test cylinders broken under compression. Two (2) cylinders shall be broken 3 and 7 days after making; and two (2) cylinders shall be broken at 28 days. The remaining two (2) cylinders shall be held for troubleshooting purposes when required. Strength results of all cylinders broken at 7 days shall achieve a minimum of 75% of the ultimate design strength, 28 days - 100% unless otherwise agreed upon for areas such as drive lanes and other areas requiring returning to full service as soon as possible.

1. Concrete Test Cylinders: 6" diameter x 12" (or 4” diameter x 8” if maximum aggregate size is less than 1”) made at the point of deposit, molded, transported cured and tested in accordance with ASTM C 31. One set of compressive test cylinders shall be made for each 100 yards poured. Make not less than one set of cylinders for each day's pour and each class of concrete.

E. Air Content: When required, air content test shall be performed per ASTM C-173 (volumetric method for normal weight or light weight concrete) or ASTM C 231 (pressure method for normal weight concrete).

F. Laboratory Test Reports: Submit to the Structural Engineer immediately upon completion of each test. Test reports shall contain the following information:
   1. Exact mix, including quantities of admixtures, etc.
   2. Date of pour.
   3. Exact location of pour in building.
   4. Slump (at truck or on deck specified).
   5. Percentage of air entrained.
   6. 7-day test results for first two cylinders tested.
   7. 28-day test results shall be reported with both 7- and 28-day results indicated on the same report.
   8. Temperature at time of pour.

G. TESTING LABORATORY DUTIES
   1. Furnish all materials for making concrete test cylinders.
   2. At test intervals, immediately transport concrete test cylinders to the Test Laboratory.
   3. Provide verbal results of concrete test cylinders when required by the Contractor.
   4. Provide test reports of all laboratory testing in a timely fashion to the Structural Engineer and Contractor.

END OF SECTION

SECTION 04 0120 – MAINTENANCE OF MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Condition and Division 1 Specification Sections apply to this section.

1.2 DEFINITIONS

A. Repointing: The process of raking out (removing) mortar and replacing it with new mortar.

B. Pointing: The process of placing new mortar (re-building) in existing joint spaces, which have previously been raked out. This term does not include the raking out process.

C. Tuckpointing: The process of touching up existing mortar joints by filling in recesses with new mortar, without first raking out the joints.

1.3 REFERENCED STANDARDS

A. ASTM International
1. ASTM C62 – “Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)”
2. ASTM C216 – “Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)”
3. ASTM C90 – “Standard Specification for Loadbearing Concrete Masonry Units”
4. C1714 – “Standard Specification for Preblended Dry Mortar Mix for Unit Masonry”
5. C979 – “Standard Specification for Pigments for Integrally Colored Concrete”
6. C270 – “Standard Specification for Mortar for Unit Masonry”
7. C91 – “Standard Specification for Masonry Cement”
8. C207 – “Standard Specification for Hydrated Lime for Masonry Purposes”
9. C595 – “Standard Specification for Blended Hydraulic Cements”
10. C1157 – “Standard Performance Specification for Hydraulic Cement”
11. C1329 – “Standard Specification for Mortar Cement”
12. C1489 – “Standard Specification for Lime Putty for Structural Purposes”
13. C144 – “Standard Specification for Aggregate for Masonry Mortar”
14. C780 – “Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry”
15. C1324 – “Standard Test Method for Examination and Analysis of Hardened Masonry Mortar”

B. Brick Industry Association (BIA) Tech Notes
1. Tech Note 1 – “Hot and Cold Weather Construction”
2. Tech Note 7B – “Water Penetration Resistance – Construction and Workmanship”
3. Tech Note 8 – “Mortars for Brickwork”
4. Tech Note 18A – “Accommodating Expansion of Brickwork”
5. Tech Note 20 – “Cleaning Brickwork”
6. Tech Note 23A – “Efflorescence - Causes and Prevention”
7. Tech Note 46 – “Maintenance of Brick Masonry”

1.4 SUBMITTALS

A. Submit separate samples, data, cleaning programs, photos, etc.

B. Product data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that product comply with requirements.

C. Samples for verification purposes, prior to erecting the mockup, of the following:
   1. Each new exposed masonry material to be used for replacing existing materials. Include in each set of samples the full range of colors and textures to be expected in the completed Work.
      a. Provide straps or panels containing not less than four brick and block units.
      b. Have each set contain a close color range of at least six samples of different mixes of colored sands and cements that produce a mortar matching the existing masonry when cured and dry.
      c. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each sample was made.

D. Samples for Verification: For the following:
   1. Each type of mortar for pointing and masonry rebuilding and repair in the form of sample mortar strips 6 inches long by 1/4-inch-wide set in aluminum or plastic channels.
   2. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments is any.
   3. Each type of repair anchor.

E. Before and after, close up, color photographs of testing cleaning, restoration, and new masonry construction mock-ups.

1.5 QUALITY ASSURANCE

A. Mockups: Prepare mockups of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.

B. Source of Materials: Obtain materials for masonry restoration from a single source for each type of material required (cement, sand, etc.) to ensure a match of quality, color, pattern, and texture.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets, or in heavy-duty cartons. Unload and handle to prevent chipping and breakage.

B. Deliver other materials to Project site in manufacturer’s original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer’s original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

E. Store sand where grading and other required characteristics can be maintained, and contamination avoided.

F. Protect masonry restoration materials during storage and construction from rain, snow, and ground water, and from staining and mixing with soil and other materials.

G. Protect grout, mortar, and other materials from deterioration by moisture and temperature. Store in a dry place or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing.

H. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

1.7 PROJECT CONDITIONS

A. The Contractor shall thoroughly inspect the premises to become familiar with existing conditions and to formulate an acceptable plan of action consistent with the following performance criteria.

B. Clean masonry surfaces only when air temperature is 40° F (4 deg C) and above and will remain so until masonry has dried out, but for not less than 7 days after completion of cleaning.

C. Do not repoint mortar joints or repair masonry unless air temperature is between 40° F (4 deg C) and 90° F (27 deg C) and will remain so for at least 48 hours after completion of work.
   1. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing unless otherwise indicated: When air temperature is below 40 deg. F, heat mortar ingredients, masonry repair materials, and existing masonry wall to produce temperatures between 40 and 120 deg. F. When mean daily air temperature is below 40 def. F, provide enclosure and hear to maintain temperatures above 32 deg. F within the enclosure for 7 days after repair and pointing.
   2. Hot-Weather Requirements: Protect masonry repair and mortar-jointing pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg. F and above unless otherwise indicated.

D. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

1.8 COORDINATION

A. Coordinate masonry restoration with public circulation patterns at project site.

B. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Immediately remove grout and mortar in contact with exposed masonry and other surfaces.

C. Protect sills, ledges, and projections from mortar droppings.

1.9 SEQUENCING/SCHEDULING

A. Order replacement materials at the earliest possible date, to avoid delaying completion of the Order sand and gray Portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at project site a sufficient quantity to complete project.

B. Perform masonry restoration work in the following sequence:
   1. Repair existing masonry, including replacing existing masonry with new masonry materials.
   2. Rake out existing mortar from joints indicated to be repointed.
   3. Repoint existing mortar joints of masonry indicated to be restored.
   4. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

5. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
6. Clean masonry surfaces. Remove plants, paint, and soot prior to general cleaning.
7. Point existing mortar joints of masonry indicated to be restored.

PART 2 - PRODUCTS

2.1 FACING CLAY MASONRY UNITS

A. ASTM C-216, Solid Clay - Brick intended for both structural and nonstructural masonry where external appearance is a requirement.
   1. Percent Solid: 100 percent
   2. Weathering Index and Compressive Strength: Grade SW, 5000 psi (Average)
   3. Type: FBS
   4. Size: Match existing adjacent brick to remain, UNO.

B. Provide units with color, surface texture, and size to match existing brickwork, UNO.

2.2 MORTAR MIXES

A. It is the intent of this specification that new mortar strength is less than or approximately equal to the strength of the existing mortar.

B. Colored Mortar: Produce mortar of color required by using selected ingredients as determined by preconstruction testing and mockups. Do not adjust proportions without A/E's approval.
   1. Colored Mortar Pigment: Where colored metallic oxide mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight. For carbon black pigment, limit quantity to 2 percent of cement content by weight. When using metallic oxide or carbon black pigments for mortar cement and masonry cement, reduce the above pigment percentages by half.
   2. Do not re-temper colored mortars without explicit direction by the manufacturer, as color may be affected.
   3. For pre-manufactured mortar blends, representative from manufacturer shall be available to review existing conditions prior to finalizing mix design.

C. Aggregate for Mortar: ASTM C 144 unless otherwise indicated. Match existing as determined by preconstruction testing and mock-ups.
   1. Colored Mortar Aggregate: Provide natural sand of color necessary to produce required mortar color. Match existing as determined by preconstruction testing for each building.
   2. For pointing mortar, provide sand with rounded edges.
   3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
   4. For pre-manufactured mortar blends, representative from manufacturer shall be available to review existing conditions prior to finalizing mix design.

D. Do not use admixtures of any kind in any masonry pointing or repointing mortars. Do not use latex or other field-applied bonding agents.

E. Pre-packaged Single-Component Pointing Mortar Mixes for Brick Masonry: Non-shrink, Type N Masonry Cement (ASTM C 270) with a maximum modulus of elasticity of 160 ksi.
   1. Manufacturers:
      a. "Jahn M110 JN" by Cathedral Stone Products
      b. "Repoint Type N" by Conproco
      c. "TP-01" and "TP-05" by Spec Mix, LLC
   2. Color: As determined from approved pre-testing and mockup.

2.3 MASONRY WALL TIES AND ANCHORS

A. Retrofit Wall Ties (Masonry & Concrete): Metal ties for securing new masonry veneer to existing masonry or concrete walls.
   1. Material: Hot-dipped galvanized 16-gauge plate and 3/16” Ø adjustable wire tie.
   2. Manufacturer: Hohmann & Barnard “Type BL-5407” and “Type VBT” tie
   3. Anchoring: Hohmann & Barnard “Type 523” 3/8” Ø brass expansion bolt
   4. Minimum Capacity: 359 lbs. allowable (tension) in concrete, CMU shell or solid joints.
   5. Length: Contractor to verify based on existing conditions.

2.4 ACCESSORIES

A. Flexible Joint Fillers
   1. Non-Bituminous Sheet: Closed cell elastic sponge rubber ASTM D 1752, Type 1; Size 1 inch less width than masonry units; 1/2 inch thick for 3/8-inch joints.
   2. Non-metallic Expansion Joint Strips: Pre-molded filler strips complying with ASTM D 1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression-deflection range of 2-5 psi), compressible up to 35 percent, of width and thickness indicated, formulated from neoprene or urethane.

B. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.5 CLEANING MATERIALS AND EQUIPMENT

A. Water for Cleaning: Clean potable free of oils, acids, alkalis, salts, and organic matter.
   1. Warm Water: Heat water to a temperature of 140° and 180° F for pre-dampening surfaces to be chemically cleaned, removal of chemical products, and basic cleaning.

B. Brushes: Natural or synthetic fiber bristle only. No metal cleaning pads, or bristles shall be permitted.

C. Cleaners, Solvents, Degreasers, and Detergents: The contractor shall identify all of the masonry materials that will be cleaned with proposed products during submittal process. The contractor shall obtain the assistance of the manufacturer in methods and application of products. Muriatic (Hydrochloric) acids are not approved for cleaning of masonry.

D. Spray Equipment: Provide equipment for controlled spray application of water and detergent at rates specified in the "Submittals" Article for pressure, measured at spray tip, and for volume. Adjust pressure and volume, as required, to ensure that damage to masonry does not result from cleaning methods.
   1. For water spray application, provide a fan-shaped spray tip that disperses water at an angle of not less than 15°.
   2. For heated water spray application, provide equipment capable of maintaining a temperature at flow rates indicated between 140° and 180° F.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Comply with the chemical cleaner manufacturer’s recommendations for protecting building surfaces against damage from exposure to their products.

B. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, plants, and surrounding buildings, pavements, and all other off-site surfaces and materials from injury resulting from masonry restoration work.
   1. Prevent cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be injured by such contact.
   2. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
   3. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
   4. Neutralize acidic and caustic rinse water prior to disposal when required by local requirements.
   5. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles that must remain in operation during course of masonry restoration work.
   6. Protect openings into the building to prevent entry of cleaning solutions to the interior of the building.

3.2 CLEANING MASONRY, GENERAL

A. Proceed with cleaning in an orderly manner. Work in directions required in an orderly sequence to properly clean masonry and concrete, and to control drips and running of cleaning materials.

B. Use only those cleaning methods indicated for each masonry material and location.

C. Prior to cleaning, the contractor shall review all stain types with the A/E and propose the cleaning product and methods. Except for general water blasting and gentle detergents, stain-specific cleaning products shall only be applied over the area that is deemed to be necessary, and no more.

D. Perform each cleaning method indicated in a manner that results in uniform coverage, of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

E. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting. Concrete and masonry surfaces are porous and require thorough rinsing to remove cleaner residues and avoid unwanted reactions with the substrates or subsequent coatings or protective treatments.

F. Whether a stain results from chemical reactions within a brick or external materials being spilled, splattered on, or absorbed by brickwork, each is an individual case and must be treated accordingly. When using any cleaner, the Contractor shall consult the masonry cleaner manufacturer for cleaning advice and to trial clean in an inconspicuous area before using a cleaning method on an entire project for a given type of stain.

G. Water Application Methods: Spray-apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume, and equipment. Unless otherwise indicated, hold spray nozzle no less than 6 inches from surface of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.

3.3 CLEANING BRICK AND BLOCKWORK

A. Warm Water Wash: At locations indicated, clean brick and block masonry surfaces with warm water applied as specified under "Submittals" Article.

B. Detergent Cleaning: Clean all exterior masonry and concrete with a detergent solution applied as follows:
   1. Wet masonry with warm water applied by low-pressure spray.
   2. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes, as required, to remove soil from mortar joints and crevices. Dip brush in solution often to ensure adequate fresh detergent and that masonry surface remains wet.
   3. Rinse masonry with cold water to remove detergent solution and soil, applied as follows:
      a. Low-pressure spray.
   4. Repeat cleaning procedure above where required to produce the effect established by the mockup.

C. Removing Efflorescence and Calcite: Before efflorescence is removed, any sources of moisture ingress shall be repaired, and the brickwork allowed to dry. White efflorescence can often be removed by dry-brushing or brushing with a stiff fiber brush and water. Heavy accumulations or stubborn deposits of white efflorescence are to be removed with an approved proprietary cleaner. It is imperative that the manufacturer's instructions be carefully followed. Refer to BIA Technical Note 23A for a more detailed discussion on removing efflorescence.

3.4 POINTING, REPOINTING, AND TUCKPOINTING MASONRY

A. Prior to performing raking and point operations, the Contractor shall notify the A/E for review of proposed extents of repair. Excessive mortar joint repairs beyond those required by the A/E shall be avoided.

B. Rake out joints as follows:
   1. All joints in areas indicated and all joints where mortar is missing or where loose and otherwise severely weathered.

C. Rake out joints as follows, according to procedures demonstrated in approved mock-up:
   1. Rake out mortar from joints to depths equal to 2-1/2 times their widths but not less than 1/2 inch nor less than that required to expose sound, unweathered mortar.
   2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
   3. Do not spall edges of masonry units or widen joints. Replace damaged masonry units.
      a. Cut out old mortar by hand with a chisel and mallet, unless otherwise indicated.
      b. Do not use power-operated rotary hand saws and grinders unless specific A/E's written approval is obtained based on submission by Contractor of a satisfactory quality control program and demonstrated ability of operators to use tools without damaging masonry. Quality control program shall include provisions for supervising performance and preventing damage due to worker fatigue.
      c. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet. Strictly adhere to approved quality control program.

D. Notify A/E of foreseen detrimental conditions including deep voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items. Abrasive clean embedded metals to remain and coat with approved epoxy paint where directed.

E. Mortar Measurement and Mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel, use known measure. Mix materials in a clean mechanical batch mixer.
   1. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again adding only enough water to produce a damp,

unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1 to 2 hours. Add the remaining water in small portions until reaching mortar of the desired consistency. Use mortar within 30 minutes of final mixing (2 to 2-1/2 hours after initial mixing); Retempering is permitted to replace water lost only by evaporation. Do not retemper excessively or use partially hardened material.

F. Point joints as follows:
   1. Rinse masonry joint surfaces with water to remove dust and mortar particles. Time the rinsing application so that at the time of pointing excess water has evaporated or run off and joint surfaces are damp but free of standing water.
   2. Apply the first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed, unless otherwise permitted by pre-packaged re-pointing mortar manufacturer. Compact each layer thoroughly and allow it to become thumbprint hard before applying the next layer.
   3. After joints have been filled to a uniform depth, place remaining pointing mortar in three layers with each of first- and second-layers filling approximately two fifths of joint depth and third layer the remaining one fifth. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing brick and blocks have rounded edges recess final layer slightly from face. Take care not to spread mortar over edges onto exposed masonry surfaces, or to featheredge mortar.
   4. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
   5. Cure mortar by maintaining in a damp condition for at least 72 consecutive hours including weekends and holidays.
      a. Acceptable curing methods include covering with wet burlap and plastic sheeting (“Burlene”), periodic hand misting, and periodic mist spraying using system of pipes, mist heads and timers.
      b. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
      c. Hot, dry conditions may require misting in 30 to 60 minutes. Cooler, damp conditions may require waiting several hours before beginning the curing process.
   6. For Type N or S mortars, hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.
   7. Where repointing work precedes cleaning of existing masonry, allow mortar to harden not less than 30 days before beginning cleaning work.

3.5 BRICK AND BLOCK REMOVAL

A. Prior to removal of any masonry units, the contractor shall notify the A/E for review of proposed repair areas.

B. Carefully remove by hand, at locations indicatedCut out full units from joint to joint and in a manner to permit replacement with full-size units.

C. Support and protect masonry indicated to remain that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

D. Salvage as many whole, undamaged brick and blocks as possible.

E. Remove mortar, loose particles and soil from salvaged brick and block by cleaning with brushes and water. Store brick and block for reuse.

F. Clean remaining brick and block at edges of removal areas by removing mortar, dust, and loose debris in preparation for rebuilding.

3.6 BRICK AND BLOCK REBUILDING

A. Install new or salvaged brick and block to replace removed brick and block. Fit replacement units into bonding and coursing pattern of existing brick and block. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

B. Lay replacement brick and block with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet clay brick and blocks that have ASTM C67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods that ensure units are nearly saturated but surface dry when laid. Maintain joint width for replacement units to match existing units.

C. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brick and blockwork. Match approved sample panel.

D. Point new mortar joints in repaired area to comply with requirements for repointing existing masonry and rake out mortar used for laying brick and block before mortar sets.

E. Inspect existing weeps, if any. If weeps are clogged, they shall be cleaned out by probing with a thin dowel or stiff wire. When cleaning or installing weeps, care must be exercised to not damage the existing flashing located immediately below and behind the weeps. The use of a stopper to limit the depth of penetration of the probe or drill bit may be effective in reducing the possibility of damaging the vertical leg of the flashing in the drainage cavity.

3.7 INSTALLATON – VENEER TIES AND ANCHORS

A. Ensure backup wall structure has been inspected and repaired prior to installing new anchors and ties.

B. Retrofit Wall Ties:
   1. Corrugated and dovetail anchors shall be secured to the existing block / terracotta wall with one (1) -3/16” diameter x 2” long epoxy coated Tapcon Screw per anchor. Screws shall be secured to web of block, and not placed in the mortar joints.
   2. Masonry ties shall be spaced per the following schedule:
      a. At 8 feet from all building corners and 8 feet from the top of the building parapet walls, the anchors shall be spaced 16” o/c vertically and 16” o/c horizontally.
      b. The balance of the building envelope shall have the anchors spaced 16” o/c vertically and 24” o/c horizontally.
      c. At all openings and adjacent to all masonry control joints, the first anchor shall be 8 inches maximum from the opening perimeter or control joint, then spaced per the requirements stated in items 1 & 2 above.

3.8 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, which is spray-applied at a low pressure.

B. Using metal scrapers or brushes is not permitted.

C. Using strong acid or alkali cleaning agents is not permitted.

D. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.

E. Clean mortar and debris from roof. Remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

F. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

END OF SECTION

SECTION 05 0519 – POST-INSTALLED ANCHORS IN CONCRETE & MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Condition and Division 1 Specification Sections apply to this section.

1.2 QUALITY ASSURANCE

A. Applicable Specifications: Latest edition of the following documents shall become part of this specification as if written herein. Whenever requirements conflict, the more stringent shall govern.
   1. ACI 318
   2. Mechanical Anchors: ACI 355.2, “Qualification of Post-Installed Mechanical Anchors in Concrete.”
   3. Adhesive Anchors: ACI 355.4, “Qualification of Post-Installed Adhesive Anchors in Concrete.”
   4. Expansion and Screw Anchors (Concrete): ICC-ES AC193.
   5. Expansion Anchors (Masonry) ICC-ES AC01.
   6. Screw Anchors (Masonry) ICC-ES AC106.
   7. Adhesive Anchors: ACI 355.4, “Qualification of Post-Installed Adhesive Anchors in Concrete.”
   8. Adhesive Anchors (Concrete) ICC-ES AC308.
   9. Adhesive Anchors (Masonry) ICC-ES AC58.
   10. Manufacturer’s published specifications and installation requirements.

B. References:
   1. CRSI (Concrete Reinforcing Steel Institute) CTN-M-3-11: Suggested General Drawing Notes for Adhesive Anchors.
   2. CAMA (Concrete Anchor Manufacturers Association): Special Inspection Guidelines for Post-Installed Anchors.
   3. ACI-CRSI CP80-12 Installer Workbook: Certification Program for Adhesive Anchor Installer.

C. All post-installed anchors in concrete shall have current published ICC-ES Evaluation Report indicating the anchor is approved for installation in cracked concrete as required by ACI 355.4.

D. Where material or equipment must be supported from the structure, the installer of the material of equipment support shall be responsible for supplying the anchors and meeting the requirements of this specification unless specifically noted otherwise on the plans.

E. Installer Qualification: Adhesive Anchor Installer shall meet the requirements of paragraphs 1.2.B.2 & 1.2.B.3 above.
   1. Drilled-in anchors shall be installed by a contractor with at least three years of experience performing similar installations.
   2. Installation of adhesive anchors horizontally or upwardly inclined to support sustained tension loads (as determined by the Engineer) shall be performed by personnel certified by the ACI-CRSI “Adhesive Anchor Installer Certification Program.”
   3. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer’s representative for the contractor on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:
      a. Hole drilling procedure

b. Hole preparation and cleaning technique
c. Adhesive injection technique and dispenser training / maintenance
d. Proof loading / torquing

F. Field and laboratory testing of all post installed anchors shall comply with the testing requirements of Section 01 4000, Quality Control. Perform all specified inspections and tests in accordance with ACI 301 and IBC. Testing Agency shall meet the requirements of ASTM E 329. Special inspection shall be in accordance with a current published ICC-ES Evaluation Report.

G. Certifications: Unless otherwise authorized by the Engineer, all anchors shall have an ICC ES Evaluation Report indicating conformance with current applicable ICC ES Acceptance Criteria.

1.3 SUBMITTALS

A. An ICC-ES Evaluation Service Report shall be submitted for anchors that will be considered for use on this project.
1. Anchors specifically referenced by the structural plans or specifications shall have the Evaluation Service Reports provided with a cover letter indicating the applicable notes and/or details for each anchor (unless noted otherwise).
2. Anchors not specifically referenced by the structural plans or specifications shall have the Evaluation Service Reports submitted with the associated justification.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Structural design criteria.
2. Product specifications with recommended design values and physical characteristics for epoxy dowels, expansion and undercut anchors.
3. Samples: Representative length and diameters of each type of anchor shown on the Drawings.
4. Quality Assurance Submittals:
a. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
b. Certificates: ICC ES Evaluation Reports
5. Preparation instruction and recommendations.
6. Manufacturer's installation instructions.
7. Storage and handling requirements and recommendations.
8. Installation Qualifications & Procedures: Submit installer qualifications as stated in Section 12.E. Submit a letter of procedure stating method of drilling, the product proposed for use, the complete installation procedure, manufacturer training date, and a list of the personnel to be trained on anchor installation.

C. Preliminary proposals for substitutions to specified anchors must be submitted to the A/E/Engineer in a timely fashion so that the project is not delayed.
1. The Engineer or A/E may reject proposed substitutions for aesthetics, interference, inappropriate materials, fire ratings, or any other reason.
2. If the preliminary proposal for substitutions is approved, the contractor must make a final substitution submittal in conformance with the "SUBSTITUTIONS" section included in this specification.

D. Calculations shall be submitted for all anchors and anchor groups that are shown but are not completely detailed on the structural drawings. Calculations shall be reviewed for general conformance with the design intent and shall be submitted to the Engineer for record only.
1. Calculations are required to be submitted:
a. Where design loads are shown on structural documents in lieu of completely detailed anchor information.

b. When a proprietary anchor is shown on the plans and a different anchor is substituted.

E. Installer Certifications
1. Submit record of ACI-CRSI “Adhesive Anchor Installer Certification Program” certifications for all proposed personnel who will be installing adhesive anchors in a horizontally or upwardly inclined position, which support sustained tension loads.

F. Closeout Submittals: Submit the following:
1. Record Documents: Project record documents for installed materials in accordance with Division a Closeout Submittals Section.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store anchors in accordance with manufacturer’s recommendations. For adhesive anchors, consider temperature, exposure to sunlight, and shelf life.

1.5 SUBSTITUTIONS

A. Anchors included in this specification, but not shown in a specific detail, may be considered a substitution anchor for that detail. The contractor must submit a preliminary proposal for substitution as noted in the “SUBMITTALS” section of this specification. The structural capacity of the substitute anchor or anchor group must be no less than the capacity of the original anchors or the design load when shown on the plans.

B. Other post-installed anchors will be considered in lieu of specified anchors provided they meet the requirements of both the “QUALITY ASSURANCE” section and the “SUBMITTALS” section of this specification. Submittals must be approved in writing by Engineer prior to installation.

C. Cast-in anchorage in lieu of post-installed anchors will be considered provided that the anchors meet the requirements of the latest edition of ACI 318, Appendix D and calculations are prepared in conformance with the “SUBMITTALS” sections of this section.

D. It is the contractor’s responsibility to obtain preliminary approval for substitutions from the A/E and Engineer in a timely fashion in conformance with the “SUBMITTALS” section of this specification.

E. The contractor proposing substitutions shall be responsible for all additional costs incurred related to that substitution, including those of other trades and design professionals. The contractor proposing substitutions shall be responsible for coordination with all other trades.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fasteners and Anchors
1. Bolts and Studs: ASTM A307; ASTM A449 where “high strength” is indicated on the Drawings.
2. Carbon and Alloy Steel Nuts: ASTM A563.
3. Carbon Steel Washers: ASTM F436.
4. Carbon Steel Threaded Rod: ASTM A36; or ASTM A193 Grade B7; or ISO 898 Class 5.8.
5. Wedge Anchors: ASTM A510; or ASTM A108.
6. Stainless Steel Bolts, Hex Cap Screws, and Studs: ASTM F593.
7. Stainless Steel Nuts: ASTM F594
8. Zinc Plating: ASTM B633.
9. Hot-Dip Galvanizing: ASTM A153.

10. Reinforcing Dowels: ASTM A615.

2.2 PRODUCTS AND MANUFACTURERS FOR USE IN CRACKED CONCRETE

A. Expansion Anchors and Wedge Anchors:
   1. HILTI KWIK BOLT-TZ2
   2. HILTI HSL-3
   3. HILTI KWIK BOLT 1

B. Screw Anchors:
   1. HILTI KWIK HUS-EZ (KH-EZ)
   2. HILTI KH-EZ I
   3. HILTI KWIK HUS (KH) – (Uncracked Concrete Only)
   4. Approved Equal

C. Undercut Anchors:
   1. HILTI HDA
   2. Approved Equal

D. Adhesive Injection Systems for Anchoring Bolts or Reinforcing Steel into Concrete (Hammer drilled applications only, unless otherwise noted):
   1. HILTI HIT-RE 500 V3 Adhesive
   2. HILTI HIT-RE 500 V3 Adhesive (Diamond core applications)
   3. HILTI HIT-HY 200 V3
   4. Approved Equal

2.3 PRODUCTS AND MANUFACTURERS FOR USE IN GROUTED MASONRY

A. Expansion Anchors and Wedge Anchors:
   1. HILTI KWIK BOLT-TZ2
   2. HILTI KWIK BOLT 1
   3. Approved Equal

B. Screw Anchors:
   1. HILTI KWIK HUS-EZ (KH-EZ)
   2. HILTI KWIK HUS (KH)
   3. Approved Equal

C. Adhesive Injection Systems for Anchoring bolts, including use with Screen Tubes:
   1. HILTI HIT-HY 270 Adhesive
      a. Use composite mesh sleeves in hollow masonry and brick material
   2. HILTI HIT-ICE Adhesive
   3. Approved equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identify location of embedded items such as reinforcing steel, stressing tendons, conduit, heating tubes, etc. prior to drilling holes. Coordinate with respective trades if any apparent conflict exists. Exercise care in coring and drilling to avoid damaging any existing embedded items. If embedded items are encountered, stop drilling and contact Engineer immediately. Any offsets or relocations of anchors must be approved by Engineer. This contractor is responsible for the cost of any required repairs including engineering costs.

B. Install all post installed anchors in strict accordance with Manufacturer's Published Installation Instructions (MPII).

C. Drill holes of proper diameter and depth in accordance with manufacturer's published design information for that specific anchor. Use only equipment approved by anchor manufacturer. All holes shall be perpendicular to the concrete surface unless shown otherwise on structural plans.
   1. Holes for adhesive anchors must be drilled using only hammer drills. Core drilling holes for adhesive anchors is prohibited.
   2. Do not drill holes until base material has cured for a minimum of 21 days.

D. Clean out holes, properly prepare substrate, and install anchors in accordance with manufacturer's instructions. Proper tools must be on job site.

E. Expansion Anchors, Wedge Anchors, Screw Anchors and Undercut Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in part to be fastened. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the engineer.

F. For adhesive anchors, maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer. Verify that base material temperature is within manufacturer limits. Do not install adhesive anchors if any criteria do not fall within manufacturer's limits. Ensure that bore holes and anchors are free of dust, standing water, ice, debris, grease, oil, dirt, and other foreign matter.
   1. Dispose of initial mixture of hardener and resin pushed through the mixing nozzle. Mixture shall have a uniform color when installed.
   2. Do not reuse the mixing nozzle from a previous cartridge.
   3. Adhesive shall be injected from the bottom of the hole and the nozzle withdrawn as filling progresses. Spare adhesive must be visible all around the mouth of the hole following installation of the anchor.

3.2 REPAIR OF DEFECTIVE WORK

A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

END OF SECTION

SECTION 09 9120 – PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Condition and Division 1 Specification Sections apply to this section.

1.2 SCOPE OF WORK: The work required of the Contractor under this section includes providing all materials, equipment, and labor necessary to complete the following.

A. Painting of all exposed concrete surfaces withing the area of work. This includes previously painted and bare concrete surfaces.

B. Painting of fascia metals within the area of work

C. Painting of new drain piping

1.3 RELATED WORK

A. Section 03 0100 Maintenance of Concrete

B. Section 09 9726 Polymerized Cementitious Coatings

1.4 SUBMITTALS

A. General: All paint submittals be prepared by an authorized representative of the paint manufacturer. A cover letter shall be included with all submittals that states the project specifications have been reviewed and the submitted products meet or exceed these specification requirements - including all warranties. The paint manufacturer’s authorized representative shall ensure that the right products are submitted, used, and properly applied to provide the warrantee certificate required.

B. Product Data: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.

C. Samples for initial color selection in the form of manufacturer's color charts. After color selection, furnish the Owner a color chart for surfaces to be coated.

D. Maintenance Materials: (Turn over to Owner upon completion)
1. Each type and color of finish: One gallon each.
2. Include color pigmentation formulation.

1.5 INFORMATIONAL SUBMITTALS

A. WARRANTY CERTIFICATE: The painting contractor shall be required to submit a 10-year Non-Prorated manufacturer's labor, material, and workmanship warranty for all painted surfaces (including concrete coatings material) which states that the product and all treated concrete surfaces will be free of all defects relating to material bond and material weathering, and the new paint film will not peel, blister, crack or deteriorate for a period of 10 years from the completion of the project. This includes all future labor and material deemed necessary to

repair/reinstall the paint film and concrete coating material if any future deterioration occurs.

1.6 QUALITY ASSURANCE

A. The painting contractor shall furnish all labor, materials, tools, and equipment necessary for the cleaning, preparation, sealing and painting of all specified surfaces.

B. The Painting Contractor shall be responsible for all aspects of safety administration on the job and must be in compliance with all OSHA safety regulations.

C. All work is to be done in a workmanlike manner by skilled workers and carried out in such a way as to minimize any inconvenience to the occupants. The painting contractor shall maintain a full workforce from the start to the completion of the work and shall leave a qualified Foreman on the job at all times. The painting contractor shall be responsible for making sure that all the painting contractor’s employees be fully and properly clothed in identifiable uniforms while working on the premises or entering any part of the facilities. The skilled workers will be thoroughly trained and experienced in their necessary trade and will be completely familiar with the specification requirements and methods for the proper performance of the work in this specification.

D. Stop exterior work early to permit paint film to set up before condensation caused by night temperature drops occur. Do not begin painting until surfaces are moisture free.

E. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

F. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. The paint to be used for parking line striping shall be compatible with the final concrete surface applied sealers, membrane coat materials and concrete and be in the colors to match the existing pavement markings.

G. Field Samples: Provide full-coat finish samples on a least 10 sq. ft. of surface until required sheen, color and texture are obtained; simulate finished lighting conditions for review of in-place work. Final acceptance of colors will be from job-applied samples.

H. Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

I. The manufacturer(s) field representative(s), through the Contractor, shall perform bond testing on all representative project substrates.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the jobsite in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, with the following information.
   1. Product name
   2. Product description
   3. Manufacturer's stock number and date of manufacture
   4. Application instructions
   5. Color name and number

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum

ambient temperature of 45 degrees Fahrenheit. Maintain containers used in storage in a clean condition, free of foreign materials and residue. Do not store volatiles, solvents (including rags and tool cleaning pails) within the building.

C. Manufacturer's Recommendations: Comply with each specific printed recommendation.
   1. Respect requirements of preparation, temperatures, pot life, drying and recoating times.
   2. Utilize tools and equipment recommended for products.

1.8 JOB CONDITIONS

A. Apply solvent thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees Fahrenheit and 95 degrees Fahrenheit. Prevent wide variations in temperature which might result in condensation on freshly painted surfaces.

B. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 degrees Fahrenheit above the dew point, or to damp or wet surfaces.

C. Avoid painting any surfaces while they are exposed to hot sun.

D. Provide proper conditions of ventilation and light; Use artificial light in quantity equivalent to normal occupancy lighting.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers
   1. Master Builders Solutions
   2. Euclid Chemical
   3. Benjamin Moore Paints
   4. Sherwin-Williams Company
   5. PPG Paints Company

B. Colors are to be those as approved by the owner. A duplicate color chip schedule shall be supplied to the painting contractor.

C. All paint and coatings must be delivered to the job site in the manufacturer's original sealed containers.

D. The owner reserves the right to take a representative sample of any materials the painting contractor brings on the job and have it tested by an appropriate laboratory to verify the materials conform to the specifications set forth herein.

E. Due to different conditions of surfaces being painted, the painting contractor must assume responsibility for coverage of paint. Test patches should be completed prior to beginning of work to ensure satisfactory coverage of material. The contractor is required to obtain a uniform finish and there is a possibility that additional coats will be required on the repaired surfaces to match existing adjacent areas. All costs associated with additional coatings/products to blend the repaired areas with adjacent existing areas is considered to be included in the scope of work. Application of the primer shall not start unless the surface preparation is approved by the paint manufacturer and the Engineer.

F. Color differences due to different batches are inherent in the paint industry. The painting

contractor shall try to order as much of any custom mix color at one time ready-made from the factory or the paint store in order to avoid batch color differences. As this might not be feasible in all circumstances, if smaller batches do need to be taken for whatever reason, the painting contractor shall retain an amount needed from a particular batch to touch up those areas painted in that batch of paint to help avoid “touch-up” problems.

G. If any reduction of the coating’s viscosity is necessary, it shall be done in accordance with manufacturer's label directions.

2.2 EXTERIOR METALS

A. Rust-Inhibiting Multi Component Epoxy and Urethane:
   1. Primer
      a. Benjamin Moore’s Corotech Metal Organic Zinc Primer V170
   2. Intermediate
      a. Benjamin Moore’s Corotech Polyamide Epoxy V150 and V155 pre-primer
   3. Finish
      a. Benjamin Moore’s Corotech DTM Aliphatic Mastic Urethane Satin V572

2.3 CONCRETE COATING MATERIAL:

A. Contractor shall coordinate with manufacturer suitability for coating over cementitious waterproofing coatings required for this project. Primers and application shall be adjusted by the manufacturer as required.

B. Smooth High Build Acrylic:
   1. Master Builders Solutions:
      a. Masterprotect HB400 (2 coats) coat and P100 primer
   2. Euclid Chemical
      a. Tammolastic (2 coats) with Tamms H/P primer
   3. Approved equal

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Execute work in accordance with label directions. Coating applications shall be made in strict conformance to this specification and to the manufacturer's paint instructions on the labels and product data sheets.

3.2 STAGING AREA

A. The painting contractor is to submit their requirements for a staging area (shop and storage areas). The owner shall make every effort to provide a suitable area. At the end of the working day, all equipment, ladders, paint supplies, vehicles etc. must be returned to the staging area and the working area must be left clean. Protection of this area is the sole responsibility of the painting contractor and shall be left in a clean, safe, and acceptable manner.

3.3 REMOVAL

A. Upon completion of an area, it shall be left in a clean and orderly condition and all paint splatters, contaminated rags and trash shall be removed.

B. The paint contractor shall be responsible for the proper disposal of any hazardous waste generated during the course of the work. Upon completion of the job, the painting contractor must remove all surplus material, scaffolds, etc. from the premises that relate to their trade. The painting contractor shall clean all window glass free of excess paint and splatters and remove paint that has been misplaced on any other surfaces.

3.4 PREPARATION OF THE SURFACES

A. The Painting Contractor shall be wholly responsible for the quality of their work and is not to commence any part of it until all surfaces are in proper condition.

B. All surfaces are to be pressure cleaned of mildew, grease, chalk, peeling paint and other residues. If, for any reason, the surface cannot be cleaned this condition must be promptly reported to the Owner or the Painting Contractor will assume responsibility for the condition.

C. Previously painted surfaces must be prepared by removing all loose and peeling paint to a sound substrate by fine sanding and wire brushing to assure a proper surface for adhesion. Fill all exposed metal using compound to eliminate ghosting.

D. All metal and aluminum surfaces must be free of grease, oil, mildew, dirt, and shall be cleaned in accordance with SSPC-SP1-63. Solvent cleaning followed by removal of all loose rust and peeling paint by use of hand tools or power cleaning. Rusted surfaces to be cleaned in accordance with SSPC-SP2-63, Hand Tool Cleaning or SSPC-SP3-63, Power Tool Cleaning. Solvent-wipe all surfaces with Xylene or Lacquer thinner.

E. If the Painting Contractor considers any surface unsuitable for proper finishing, they are to notify the Owners of this fact in writing. The Painting Contractor is not to apply material until corrective measures have been taken, or the Owners have instructed them to proceed under the current conditions.

F. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, and similar items in place that are not to be painted or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

G. Prior to painting, apply protective tape and paper to sliding glass doors glass, gaskets, and brushes to prevent damage and overspill to parts of the sliding glass doors not assigned for painting.

H. Occasionally the Painting Contractor’s cleaning technique develops or reveals an unforeseen condition that requires additional labor and materials. The Painting Contractor must either negotiate their contract or assume the responsibility for properly correcting the condition.

I. The prime coat shall be applied soon after surface preparation has been completed, so as to prevent contamination of the substrate.

J. Tinting: Tint each undercoat a light shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.5 SURFACE CLEANING AND DEGLOSSING

A. The Painting Contractor is required to clean and de-gloss surfaces prior to the application of the specified coatings.
   1. If necessary, sanitize surfaces using the method above for mold and mildew.
   2. The preferred method of de-glossing is to power sand surfaces. The resulting surface profile depth shall not exceed 3/4 the specified primer dry film thickness.
   3. Remove sanding dust and clean surface with a detergent to remove contamination from equipment and body oils. Rinse thoroughly and allow to dry completely.

B. When mechanically abrading the surface is not possible, substitute with the following preparation:
   1. Wearing gloves, saturate a coarse, lint free cloth or nylon scouring pad with undiluted Krud Kutter Gloss Off Prepaint Surface Preparation or another similar product that the servicing dealer recommends.
   2. Apply to the surface with a circular motion.
   3. Fold and saturate the cloth frequently.
   4. Avoid application to surfaces that are not to be repainted.
   5. When the clean, de-glossed surface is dry to the touch, new finish can be applied.
   6. Maximum bonding is achieved when the new finish is applied within one hour of application

3.6 DELAMINATING COATINGS

A. Surfaces to be painted shall be made free of loose and delaminating coatings by the Paint Contractor. Delaminating that occurs as a result of insufficient preparation will be the sole responsibility of the Painting Contractor.

B. Concrete Surfaces
   1. Power Tool Clean using sufficient power at angles that will remove loose coatings without damage to the surface.
   2. Test all edges of remaining coatings by Hand Tool Cleaning using a thin bladed sharp steel scraper.

C. Smooth surfaces shall be cleaned of all contaminates and sanded to provide a good bond for the new paint material.

D. Prime surface with the specified materials.

E. Taper edges of remaining coatings to a smooth transition between levels using the specified patching materials.

F. Prime patching material with the specified material.

G. Surfaces that cannot be properly prepared without damage to the surface shall be brought to the attention of the Owner or their agent immediately upon discovery. These surfaces will be noted and withheld from the warrantee areas.

3.7 SUBSTRATE PREPARATION

A. Improper Surface Preparation
   1. Strictly following all surface preparation instructions on all surfaces is essential to achieve maximum benefits of the coatings to be used.

B. Previously Painted Concrete Surfaces
   1. Preparation

a. Any mold and mildew must be removed as described in the section titled Mold and Mildew Removal.
b. Any areas exhibiting efflorescence deposits shall be treated with a 25% solution of Muriatic Acid to water, scrubbed and then thoroughly rinsed with clear water to neutralize any acidity. A pH test should then be conducted to verify if any further actions should be taken.
c. All new concrete (including repairs) shall be cured for a minimum of 21 days prior to installation of primer coat unless otherwise approved in writing by the manufacturer.
d. Concrete repairs shall be completed as required by this project's specifications and contract documents to the satisfaction of the A/E.
e. Fill all bug holes and other surface imperfections with approved materials to the satisfaction of the paint manufacturer's representative and A/E to obtain the required warrantees.

2. Cleaning
   a. Pressure clean all surfaces with pressure washing equipment of at least 3500 psi or greater being sufficient enough to remove as much existing deteriorating coating as possible. It is recommended to use a rotating nozzle on the pressure cleaner to facilitate removal of the existing deteriorating coating and to help identify any areas that are not presently deteriorating. All surfaces must be free of dirt, grease, oil and chalk. All surfaces are to dry thoroughly. If necessary, repeat procedure. Surfaces are to be tested with phenothelien (chemically) to make sure concrete has cured before any coating is applied.
   b. Rust stains must be thoroughly removed. After wetting the surface with water, apply a solution of 2% oxalic acid or appropriate oxalic acid compound in water. It is important to observe the precautions listed on the container or these compounds for safe handling and storage. Wash with sponge and scrub brush until stain is removed, then rinse with clean water. Where rust staining was evident spot prime areas with one coat of Acrylic Metal Primer. Apply two coats if necessary.
3. Surface Sealer
   a. After proper surface preparation, prime the entire exterior surface with one coat of the recommended conditioner according to the manufacturer's label instructions.
   b. Certain colors may require a pigmented sealer.
   c. Contractor is responsible for testing sealer coverage. The Painting Contractor may choose to use a pigmented sealer.
   d. Ceiling and soffit areas that do not exhibit chalky residue do not require sealer.
4. Finish Coat
   a. After all crack repairs have fully cured, apply as needed the number of coats recommended, at a rate of application as stated on the label directions and to achieve uniformity of sheen and opacity of color. NOTE: Previously repaired cracks, which have reopened, shall have all existing patch material removed and the crack treated as described above.

C. Previously Painted Metal Surfaces
   1. Surfaces to be painted shall be cleaned with an appropriate solvent or detergent solution to remove all traces of dirt, dust, grime, and oily residues prior to application of the specified coatings in accordance with SSPC-SP1-63 "Solvent Cleaning".
   2. Surfaces that exhibit moderate to heavy chalk must be cleaned by power wash. Any mold and mildew must be removed as described in the section titled Mold and Mildew Removal.
   3. Loose, peeling, blistering, and flaking paint and rust shall be removed by power tool cleaning with wire brush, needle gun, scraping, or sanding in accordance with SSPC-SP3-63 "Power Tool Cleaning". Surfaces with a hard-shiny finish should be dulled by sandpaper or other abrasive methods to insure adhesion of succeeding coats. Where rust, corrosion and deteriorated coating exist, the surfaces should be abrasive blast cleaned in accordance with SSPC-SP6-63 "Commercial Blaster Cleaning". The surfaces should be blown off with compressed air to remove traces of blast products and primed within 24 hours with the specified primer.

4. Glossy surfaces should be dulled by sanding. Where rust, corrosion and deteriorated coating exist, the surfaces should be abrasive blast cleaned in accordance with SSPCSP6-63 “Commercial Blaster Cleaning”. The surfaces should be blown off with compressed air to remove traces of blast products and primed within 24 hours with an approved Rust-Inhibitive Product according to the manufacturer label instructions.
5. After proper preparation, solvent wipe with denatured alcohol and apply one coat of Rust Pretreatment to the exposed metal & rusted surfaces.
6. To the properly prepared surface prime or spot prime as necessary with the recommended Rust Inhibitive Product according to the manufacturer label instructions.
7. To the properly sealed surface apply the coats needed to achieve uniformity of sheen and opacity of color using the manufacturer’s recommended topcoat.
8. All abrasion media for blast cleaning shall contain less than 0.2% free silica.

3.8 APPLICATIONS

A. Sample Panel Application
1. The contractor shall prepare a sample panel of the coating material using all of the techniques described below for review and acceptance from the Owner and A/E. No additional coating material shall be installed until all necessary approvals have been received, and the contractor has been authorized by the Owner to proceed with the scheduled work.

B. Mixing
1. Mechanically mix coating material at slow speed with a drill and mixing paddle to ensure color uniformity and aggregate disbursement and minimize air entrapment.
2. In multi-pail applications, mix the contents of each new pail into the partially used pail to ensure color consistency and smooth transitions from pail to pail.

C. Scheduling Painting:
1. Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
2. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat. Allow interior paint to dry at least 24 hours between coats.

D. Concrete Coating Material
1. Pretreat all cracks as detailed in the crack preparation section.
2. Apply MasterProtect HB 400 by brush, spray, roller, or spray and backroll.
3. Apply MasterProtect HB 400 in 2 coats to achieve a total dry-film thickness (DFT) of 16 – 20 mils to obtain a pinhole-free, consistent film build on all treated surfaces.
4. Proper wet-film thickness (WFT) must be maintained during application to ensure the performance characteristics desired.
5. Always work to natural break and maintain a wet edge during application.
6. Do not apply to frozen or frost-covered surfaces or at temperatures (substrate or ambient) at or below 40F or when temperatures are expected to drop below 40F within 24 hours after application.
7. Do not apply if rain is expected within 24 hours of application.

E. Concrete and Metal Surfaces:
1. Apply paint on surfaces in accordance with manufacturer's directions and this specification.
   a. Apply a 4 by 4 ft. (1.2 by 1.2 m) test area to verify acceptable color, texture, and adhesion before proceeding with any project.

b. Adhesion should be verified by a test area. The test method for measuring adhesion is ASTM D 3359. Measuring Adhesion by Tape, Method A. On the 0 – 5 scale, a minimum adhesion rating of 4A is required.

2. Use applicators and techniques best suited for substrate and type of material being applied.
3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
4. Paints shall not be diluted for purpose of spraying.
5. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.
   a. Structural Steel:
      i. Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions. Use painting methods which will result in full coverage of joints, corners, edges, and all exposed surfaces.
   b. For all other painted surfaces, provide not less than 1 primer coat plus 2 separate and distinct coats of finish paint. Apply additional coats over the entire surface until the paint film is of uniform finish, color appearance and coverage, specifically when previous color, stain, dirt, spackle, patching, or undercoats show through final coats.

F. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.9 REPAIR AND CORRECTION

A. Repair damage (resulting from painting) done to the work of others and existing work.

B. Correct work damage caused by drafty, dusty conditions or cold, to complete satisfaction, without additional cost.

C. Refinish entire surface where portion of finish has been damaged or is not acceptable.

D. No claims will be allowed for correction of defective work caused by failure to adequately prepare substrates and abide by the manufacturer’s recommendations.

3.10 CLEANING: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site. Upon completion of painting, clean glass, and paint-spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.11 PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing, or replacing, and repainting, as acceptable to A/E.

B. Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.12 SAFETY: The Contractor shall provide and maintain a hand-held all-purpose fire extinguisher near the paint storage and mixing area.

END OF SECTION

SECTION 09 9726 – POLYMERIZED CEMENTITIOUS COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Condition and Division 1 Specification Sections apply to this section.

1.2 SUMMARY:

A. Work of this section includes supply and installation of polymerized cementitious coating system to exposed concrete struts as indicated on the drawings and details. Included in this work shall be the preparation of the surface to receive the coating system, including removing the existing coating system, cleaning of the concrete, repair of surface defects and treatment of cracks and control joints as required by the coating manufacturer.

1.3 RELATED WORK

A. Section 03 0100 – Maintenance of Concrete

B. Section 09 9120 – Painting

1.4 SUBMITTALS

A. Product Data: Submit product literature and installation instructions.

B. Samples: Submit samples of specified polymerized cementitious coating system. Samples shall be construed as examples of finished color and texture of cementitious coating system only. Where special colors or surface textures are required, two (2) samples shall be submitted.

C. Applicator's License Certificate: Submit a currently dated certificate, signed by the polymerized cementitious coating manufacturer, showing the applicator as approved and licensed to install the specific system.

D. Material certificates signed by the manufacturer certifying that the polymerized cementitious coating complies with requirements specified herein.

E. Submit a schedule showing job sequence, work areas to be affected, and planned traffic flow where pertinent.

F. Guarantee: Upon completion of the project, submit a comprehensive guarantee of the traffic bearing membrane system, signed by the Applicator and the Manufacturer of the specified system, for a period of five (5) years.
   1. Warrant all work against defects of materials and workmanship.
   2. States that the systems installed are for water integrity of the deck for the full warrantee period from the time of acceptance by the owner and engineer.
   3. States that the membrane shall remain watertight over new cracks up to 50 mils wide that form in the concrete deck after the membrane is installed.
   4. This excludes damage from fires, structural failure, Acts of God, or willful damage.

G. Maintenance Data:
   1. Prepare a chapter for incorporation into the Project Maintenance Manual including Manufacturer's literature and maintenance instruction for the care and service of the polymerized cementitious coating system.

1.5 QUALITY ASSURANCE

A. Supplier Qualifications:
   1. Manufacturer shall supply a technical representative on the job site during the course of the work, as recommended by the manufacturer.

B. Single-Source Responsibility:
   1. Obtain polymerized cementitious coating materials including resins, dry powder components and finish or seating coats from a single manufacturer.

C. Applicator Qualifications:
   1. Applicators shall be approved by the manufacturer as licensed applicators.
   2. Applicator shall submit a list of five (5) projects in which similar work to that specified was successfully completed. The list shall contain the following for each project: Project name, Property owner, Owner's representative's name and phone number, Scope of work, Date of completion, Total square footage of work.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Materials shall be delivered in original sealed containers, clearly marked with the supplier's name, brand name, and type of material. All materials shall be accompanied by the proper MSDS forms, directions for storage and mixing with other components.

B. Storage and Handling: Handle products in such a manner as to avoid damage to container. Store materials to comply with manufacturer’s directions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.7 JOB CONDITIONS

A. Environmental Conditions:
   1. Comply with manufacturer’s directions for maintenance of ambient and substrate temperature, moisture, humidity, ventilation, and other conditions required to execute and protect work.
   2. Follow manufacturer's instructions and limitations on surface conditions.
   3. Do not apply materials unless surface to receive coating is clean and dry, or if precipitation is imminent.

B. Protection:
   1. Ensure that all personnel have read and understand the information contained within the appropriate MSDS for all materials utilized. All personnel shall wear the required respiratory protection devices listed on the MSDS literature. If explosion proof electrical devices are required, ensure that all drills, fans, etc. are so equipped.
   2. Protect vegetation, surrounding areas, personal property, etc. from damage due to installation of specified system.
   3. Ensure that all work areas are properly barricaded to discourage non-related traffic through work area. Neither the Applicator, nor the Manufacturer, of the specified systems shall be held responsible for damage to the job site, specified system, or related equipment due to the trespassing of properly placed barricades.
   4. Do not allow traffic on finished system for a period of at least 24 hours following completion.

C. Ventilation:
   1. Must be provided during application and curing period.
   2. Prevent prolonged inhalation of vapors.
   3. Wear protective masks.
   4. Prevent prolonged contact with skin.

D. Fire:
   1. No smoking, sparks, welding, and open flames.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Polymerized Cementitious Coating approved suppliers shall be:
   1. “Tamoseal” by Euclid Chemical
   2. “Masterseal 581” by Master Builders Solutions
   3. “1K” or “2K/M” by Aquafin
   4. Approved equal

2.2 MATERIAL PERFORMANCE CRITERIA

A. Performance requirements for the traffic bearing membrane to be used on this project are:

Physical Test Information Complete Standard Property		
Compressive Strength	ASTM C-579	2140 psi
Tensile Strength	ASTM C-307	465 psi
Flammability	ASTM E-84	Flame Spread 4 Smoke Density 0
Resistance to Salt Spray	ASTM B-1117	1,000 hours exposure No visible degradation
Adhesion	ASTM C-882 Type I	515 psi
Freeze-Thaw Resistance	ASTM C-672	Thirty-Two cycles “O” scaling
Hardness	ASTM D-2440	Durometer A82
Water Vapor Permeability	ASTM E-96	1.95 Perms/Inches
Absorption		< 2%

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the condition under which the polymerized cementitious coating system is to be installed and notify the Contractor and Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with any work until unsatisfactory conditions have been corrected.

B. Concrete: Verify that the work done under other sections meets the following criteria:
   1. That the concrete surface is free of ridges and sharp projections.

2. That the concrete was properly cured and has obtained 100% of the projected compressive strength, and not less than 4000 psi.
3. That the curing methods used for the concrete are compatible with the coating system.
4. That the concrete finish surface has an acceptable texture to receive the coating system.
5. That damaged areas of the deck that have been repaired, match adjacent areas in relief, general appearance, and physical properties.

3.2 PREPARATION

A. General
   1. Area to receive coating shall be vacuumed and/or blown with compressed air to remove all dust and debris immediately prior to the application of the membrane.
   2. Protect adjacent surfaces with drop cloths or masking as required.

B. Damaged Concrete: Spalls and unsound areas shall be removed to sound concrete and patched to match adjacent areas, using proper materials and procedures per specification section 03 0100.

C. Condition of Surfaces: In accordance with the requirements established within Division 3, new horizontal and vertical concrete surfaces to which membrane waterproofing system is to be applied shall have a broom or belt finish in compliance with ACI 301, paragraph 5.3.4.2. The existing horizontal and vertical concrete surfaces to receive the new traffic membrane shall have all prior membranes removed by shot blasting or sandblasting. All surfaces shall be left free of loose particles, and shall be without ridges, projections, voids, and concrete droppings that would be mechanically detrimental to application or function.

D. Cleaning Concrete: Surfaces to be coated shall be free of dust, dirt, grease, oil, rust, and other surface contaminants. All soiled areas remaining after shot blasting shall be cleaned with cleaning solvents or removed by additional blasting.

E. Crack Treatment
   1. Hairline cracks and patch bond lines should be treated with Reinforcing mesh embedded in a 12” band of cementitious coating. The mesh should be placed so that the crack is at the center of the mesh. Areas with craze cracking can be treated in the same manner using the wider available mesh.
   2. Cracks over 1/16” should be routed and sealed with a two-component sealant using the proper joint configuration. These cracks should be treated as joints and be brought through coating system. These cracks should only be covered with the coating system if sufficient additional joints are cut in the concrete to absorb the movement and the cracks are epoxy injected.

3.3 APPLICATION

A. Materials: Mix polymeric cementitious coating when required and prepare materials according to manufacturer’s instructions.

B. General: Apply each component of polymeric cementitious coating system according to manufacturer’s directions to produce a monolithic surface of thickness indicated. Detail around perimeters and penetrations previous to applying coating on body of substrate.

C. Prime Coat: Apply prime coat of polymeric cementitious coating by broom and brush scrubbing it into the substrate to achieve maximum bond. Back roll prime coat to uniform finish.

D. Body Coats: Apply successive body coats of polymeric cementitious coating by broom, brush, roller, trowel, or spray over prepared substrate at manufacture’s recommended spreading rate

to produce thickness as specified. Allow to dry between coats. Embed mesh in first body coat and back roll making sure to stop mesh at cove joint on both vertical and horizontal.

E. Finish Coats: After body coat has cured sufficiently, paint cementitious coating per Section 09 9120.

3.4 CURING AND PROTECTION

A. Cure polymeric cementitious coating materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process. Close application area for a minimum of 48 hours for normal traffic.

3.5 CLEANING

A. Clean stains from adjacent surfaces with cleaning agents.

B. Remove foreign matter from finished coating surfaces.

END OF SECTION

SECTION 31 2000 – EARTH MOVING
PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this section.

1.2 SECTION INCLUDES

A. Earthwork includes areas below building foundations, below concrete slabs on grade, below paved areas, and grading of all unpaved area in the site.
   1. Layout and staking for earthwork.
   2. Excavation and rough grading.
   3. Filling, backfilling, and compaction.
   4. Includes trenching, excavation and backfill for utilities.
   5. Removal and disposal of stones, debris, excess and unsuitable materials.
   6. Field quality control, testing, and inspection.
   7. Preparing subgrades for turf and grasses
   8. Excavating and backfilling for piping

1.3 QUALITY ASSURANCE

A. Reference Standards:
   1. American Association of State Highway and Transportation Officials (AASHTO).
   2. American Society for Testing and Materials (ASTM).
   3. Maryland Department of Transportation, State Highway Administration “Standard Specifications for Materials and Construction”, as amended to date (M.S.H.A. as hereinafter referred). Delete references to Measurement and Payment.

B. Tolerances: As indicated herein.

1.4 SUBMITTALS

A. Notification:
   1. Notify and provide data to regulatory authorities and A/E prior to commencement of work.
   2. Provide notice of encounter with unknown utilities; subgrades before filling; areas requiring testing or inspection.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D2487 of each on site and borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D698 for each on site and borrow soil material proposed for fill and backfill.
   3. Field reports; in-place soil density tests.
   4. One optimum moisture – maximum density curve for each type of soil encountered.
   5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
   6. Test reports for all proposed fill materials (either from borrow sources or on-site) as follows:
      a. Particle size analysis in accordance with ASTM D 422 (sieve only).
      b. Moisture content in accordance with ASTM D 2216
      c. Modified Compaction Curve in accordance with ASTM D 1557
   7. Test reports must be submitted daily to the Architect and Owner.

1.5 PROJECT CONDITIONS

A. Erosion and sediment control:
   1. Standards: Comply with the requirements of the "Standards and Specifications for Soil Erosion and Sediment Control in Developing Areas" by the U.S.D.A. Soil Conservation Service.
   2. General Erosion: Prevent erosion of earthwork; repair and correct any ditches, gullies, or erosion immediately and upon occurrence.
   3. Excavations: Prevent water from flowing into open excavations and toward building walls.
   4. Slopes: Cover (with continuous plastic membrane) and stake all slopes steeper than 1.5 horizontal to 1 vertical.
   5. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures are in place

B. Environmental Conditions:
   1. Do not apply soil treatment when temperature is at or below freezing or when ground is frozen, or frost is expected.
   2. Do not apply soil treatment when surface water is present.

C. Existing Conditions: Accept the site in the condition which it exists at the time of the award of the contract and perform all work to the grades indicated.
   1. Protect plant material, lawns and other features not designated for removal.
   2. Protect benchmarks, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.

D. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
   1. Utility Locator Service: Notify "Miss Utility" for area where Project is located before beginning earth moving operations
   2. Should uncharted, or incorrectly charted, piping, or other utilities be encountered during excavation, consult utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.
   3. Do not interrupt existing utilities serving facilities occupied and used by others, except when permitted in writing by A/E and then only after acceptable temporary utility services have been provided. Provide a minimum of 48-hour notices to utility Owners and receive written notice to proceed before interrupting any utility.

E. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

1.6 PROTECTION

A. Safety: Provide protective measures necessary for the safety of workmen, to the public and adjacent property. Prevent cave ins, collapse of walls, structures, and slopes, both on and adjacent to the site.

B. Standards: Comply with regulations of local authorities having jurisdiction, including all applicable O.S.H.A. requirements.

C. Repair: Includes the removal and replacement with new materials affected by settlement.

PART 2 - PRODUCTS

2.1 FILL AND BACKFILL

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Satisfactory Soils:
   1. Compacted fill and backfill shall be free of deleterious matter such as frozen materials, organics, wood, debris, or rock larger than 3 inches in diameter and be classified SP, SW, SM, SC, GP, GC, GM, or GW per ASTM D-2487. Fine- grain material classified as CL, SC, OL, CH, and ML shall not be used for compacted fill or backfill under structures.
   2. The minimum dry unit weight shall not be less than 105 PCF maximum dry density as determined by ASTM D-689, standard proctor.
      a. Compacted fill and backfill behind segmental masonry retaining walls shall be sands and gravels classified SM or better and shall meet all of the requirements in spec section 32 3223.
   3. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

E. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve. Designation CR-6 in accordance with MSHA / Specifications.

F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve

H. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; AASHTO M-43, size No. 17.

I. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

2.2 FILL AND BACKFILL FOR UTILITIES

A. Should the excavated material be considered unsatisfactory for backfilling, the Contractor shall remove and dispose of such unsatisfactory material and substitute, in lieu thereof, suitable material obtained from elsewhere on or off the site.

2.3 TOPSOIL

A. Topsoil mix
   1. Topsoil shall be excavated, and reused material supplemented by new material obtained from off-site sources as required, to complete the work. Topsoil shall have a pH range of 5.0-7.0 and organic matter content of 1.0-1.5% minimum. Topsoil shall be a sandy loam in texture with a mechanical analysis of 50-60% sand, 15-25% silt, 10-15% clay.
   2. All topsoil shall be graded free of roots, rocks larger than 1", subsoil, debris, and organic material.
   3. New topsoil mix shall be 2/3 topsoil and 1/3 organic matter by volume.

B. Organic matter
   1. Peatmoss – Type 1 sphagnum peatmoss; finely divided with a pH of 3.1 – 5.0.
   2. Sedge Peat – Decomposed peat containing no identifiable fibers.
   3. Leaf Mold – Thoroughly shredded, well composted leaf material, free of trash.

2.4 FLOWABLE EXCAVATABLE FILL

A. Stabilized flowable fly ash mixture with a maximum slump of 8" and an unconfined compressive strength of 80 to 120 psi after 28 days used to fill construction excavations.

2.5 ACCESSORIES

A. Detectable Warning Tape: Acid and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
   1. Red: Electric
   2. Yellow: Gas, oil, steam, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems
   5. Green: Sewer systems.
   6. Purple: Grey (reclaimed) water

PART 3 - EXECUTION

3.1 PREPARATION

A. The Contractor shall furnish all labor, equipment and materials required to prepare site and to excavate all materials of whatever type encountered to the lines and grades shown on the Contract Drawings and as specified.

B. The Contractor shall give 48 hours advance notice to the Inspector of the impending completion of excavations so as to allow inspection of the exposed subgrade surface and review the ground water conditions.

C. Obey all applicable local and federal work safety rules and regulations.

D. Install all necessary protection equipment, structures such as fences, signs, scaffolding etc. prior to start of work.

E. Remove all existing structures, utilities, pavement in accordance with the Contract Documents.

F. Protect all utility lines which are not to be abandoned. The Contractor shall be responsible for any damage to utilities resulting from the Contractor’s actions.

G. Stockpile on-site materials anticipated for re-use. Care shall be taken to avoid blending with the deleterious materials.

H. Provide all necessary erosion and sediment control in accordance with the approved plans.

I. Verify existing ground surfaces have been stripped of topsoil, root mat and existing pavement, unsatisfactory soils, concrete spoil, obstructions, and deleterious material.

J. Locate underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Contact "Miss Utility".

K. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

L. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

M. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

N. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

O. Layout units, structures, piping, roads, parking areas and walks and establish their elevations.

P. Replace property corner markers to original location if disturbed or destroyed.

Q. Preparation for embankments and fills:
   1. Before fill is started, scarify existing earth to a minimum depth of 6 inches under new roads, parking lots, or streets.
   2. Bring existing ground surface to optimum moisture content.
   3. In areas where existing ground surface is steeper than one vertical to four horizontal, bench surface in order to spread fill horizontally so that fill material will bond with existing surface.

3.2 EXCAVATION consists of removal and disposal of material encountered when establishing required finish grade elevations.

A. Unauthorized Excavations:
   1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of A/E. Unauthorized excavation, as well as remedial work directed by A/E, shall be at Contractor's expense.
   2. Under footings, foundations, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing to excavation bottom, without altering required top elevation. Lean concrete, flowable fill, or compacted engineered fill may be used to bring elevations to proper position, when acceptable by A/E.

B. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of materials excavated.
   1. Maintain sides and slopes of excavations in safe conditions until completion of backfilling.

C. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
   1. Prevent saturation of soil above the optimum moisture content.

2. Locate and retain soil materials away from edge of excavations.
3. Dispose of excess soil material and waste materials as herein specified.

D. Excavation for Stone and Concrete Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown:
   1. Where rock or concrete spoil is encountered, carry excavation 18" below subgrade and backfill with suitable material approved by the A/E.

E. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed with ample working room.
   1. Excavate trenches to depth, lines, gradients, and elevations indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
   2. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit and 12 inches each side of pipe or conduit unless otherwise indicated.
   3. Where rock is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of crushed stone or gravel prior to installation of pipe.
   4. Grade bottoms of trenches as indicated. Where indicated excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe .
      a. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
      b. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
   5. Backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing. Concrete is specified in Division 3.
   6. Do not backfill trenches until tests and inspections have been made and backfilling authorized by A/E. Use care in backfilling to avoid damage or displacement of pipe systems.

F. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F. (1 degree C.).

G. Earthwork Quantities:
   1. Contractor shall be responsible for determining earthwork quantities for the completion of the work.

3.3 COMPACTION

A. General: Control soil compaction during construction providing percentage of dry density specified for each area classification.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of the maximum dry density which is determined in accordance with ASTM D-698, or in accordance with ASTM D-2049 for soils which will not exhibit a well-defined moisture-density relationship.
   1. Structural, pavement and walkway areas, steps, and utility trenches - 95% of the maximum dry density, except the top 12" under slab on grade and paving shall be compacted at 98% of the maximum dry density.

2. Lawn areas outside the designated structural fill limits - scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material 90% of the maximum dry density.
3. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

C. Moisture Control: Obtaining a uniformly high degree of compaction requires control over the moisture content of the material being placed in the fills and backfill. The soils used in fill and backfill shall be brought to within 3% of optimum moisture at no additional cost to the Owner.
1. Where the soil layer is too dry, the Contractor shall apply water uniformly using approved equipment to increase the moisture content to within 3% of the optimum, taking precautions to prevent free water from appearing on the surface during or subsequent to compaction operations.
2. Where the soil layer is too wet, the Contractor shall dry the soils by plowing, discing or using chemical additives to aerate the soil and reduce the moisture content to within 3% of the optimum.
3. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
4. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
5. Any standing water shall be drained or pumped into approved sediment control facilities prior to commencement of earthwork.
6. Excavations near to subgrade and all fills should be protected from heavy equipment traffic, including heavy compaction equipment, when on-site soils exhibit high moisture content, in order to minimize pumping and a generalized deterioration of these materials

3.4 BACKFILL AND FILL

A. General: Place acceptable soil material in layers not more than eight (8) inches in thickness to required subgrade elevations, for each area classification listed below. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Each layer shall be compacted to the requirements of Section 3.4.B.
1. Fill and backfill within building and pavement limits and in utility trenches shall be engineered fill soils meeting the requirements of Section 2.2.B.
2. Under lawn areas outside the designated structural fill limits, backfill and fill soils shall be soils meeting the requirements of Section 2.2.A.
3. Fill and backfill located below walkways and steps shall be constructed of engineered fill soils meeting the requirements of Section 2.2.B.
4. Drainage fill material shall be proof rolled to a uniform stable condition prior to placement of vapor retarder.
5. Stone base course shall be compacted to 98% maximum dry density per ASTM D-698.

B. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth, for material compacted by heavy compaction equipment and not more than 4" in loose depth for material compacted by hand-operated tampers. No heavy compaction equipment shall be allowed within 5 ft. of masonry or concrete retaining walls.
1. Before compaction, moisten or aerate each layer as may be necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density for each classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.
3. Compaction over one foot above the pipe shall be done with approved mechanical tampers.

C. Utility Trench backfill
   1. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
   2. Coordinate backfilling with utilities testing.
   3. Place backfill on subgrades free of mud, frost, snow, or ice.
   4. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
   5. Fill voids with approved backfill materials while shoring, bracing, and sheeting is removed.
   6. Place and compact final backfill of satisfactory soil material to final subgrade.
   7. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.5 FINISH GRADING

A. Verify surfaces are to the prescribed subgrades, within tolerances and properly compacted.

B. Remove mounds or ridges, gullies and depressions and perform other necessary repairs.

C. Tillage: After the areas to be topsoiled have been approved for proper subgrade, the surface shall be loosened and made friable by cross-discing or other satisfactory methods, to a depth of at least 4" to permit bonding of topsoil to the subgrade.

D. Remove stones and debris 1 inch or more in any dimension from the surface of the subgrade.

3.6 PLACING TOPSOIL

A. Topsoil shall be uniformly distributed and evenly spread to the depth stipulated so that it will be 4" deep after settling and the surface of topsoil is to finish grades. Immediately following placement of topsoil, the entire area shall be raked free of stones and debris over 1" in any dimension and raking removed from the premises.

B. Topsoil shall not be placed when either the topsoil or subgrade is frozen, excessively wet or in a condition otherwise detrimental to sodding or grading.

C. The finished surface shall be free of debris and stones, perfectly smoother with a maximum tolerance of 1".

3.7 SOIL PREPARATION

A. Prior to placement of lime and fertilizer the soil shall be thoroughly disked to a minimum of three (3) inches.

B. Soil preparation materials shall be evenly applied as follows. Fertilizer shall be applied, followed immediately by the application of the lime.
   1. Fertilizer: 23 lbs./1000 sq.ft.
   2. Limes: 45lbs./1000 sq.ft.

C. Following application of fertilizer and lime, all areas shall be lightly cleared of any and all debris and any stones of over 1 inch diameter.

3.8 SEED BED PREPARATION

A. All grading and soil preparation shall be completed prior to seeding.

B. Prior to seeding the top 2" of soil shall be loosened to receive seeding.

3.9 SEED BED PREPARATION

A. Seed designated areas at the rate of 1.5 lbs. per 1000 sq.ft.

B. Seeding shall be done in 2 separate operations. The second seeding shall be done immediately after the first and shall be at right angles to the first seeding.

C. Rake seed bed lightly and roll.

D. Water thoroughly.

E. Grass seed shall only be sown from mid-August to mid-October and mid-March to mid-May.

F. Seeding shall be done in dry or moderately dry soil and at times when the wind velocity does not exceed 5 miles per hour. Hydro-seeding will not be permitted.

3.10 MAINTENANCE

A. Protection of graded areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning compacted areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

C. Restore areas previously occupied by stockpiled materials to match finished condition of the remainder of the work.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials including trash, debris, and unsuitable and excess excavated material, and dispose of legally off Owner's property.

B. Dispose on Owner’s Property: Dispose of unacceptable and excess excavated material on Owner’s property and regrade as directed by A/E.

3.12 TESTING AND INSPECTION

A. INSPECTION AGENCY: Inspect and test construction of embankments, fills, backfills, trenches, and subgrades and report to the A/E conformance in all particulars to specification requirements. Inspection Agency shall be independent of any Contractor or Sub-contractor or Supplier for this project.

B. Scheduling:
   1. Assign qualified personnel to be on site at all times when operations are scheduled.
   2. The Contractor should note that no earthwork operation shall be permitted in their absence.

C. Responsibilities:
   1. Evaluation of subgrade preparation and suitability.
   2. Moisture content and field density tests on all layers of fill and backfill material placed.

3. Evaluation of degree of compaction attained for all fill and backfill material placed.
4. Testing and evaluation of borrow material.
5. Sources of borrow and of select fill.
6. Footing subgrade suitability.
7. Inspection of installation of Subdrainage system.

D. Results of Tests:
   1. Make results available to the A/E immediately upon completion of areas of layers.

3.13 CONTRACTOR'S RESPONSIBILITY

A. Submit copies of all reports indicating conformance and exceptions to contract documents in a timely fashion to General Contractor for distribution to design consultants, owner, subcontractors, and other interested parties.

B. Final Report: The Inspection Agency shall prepare a written report that summarizes the work inspected during the course of the project and certifies that the work meets the requirements of the contract documents, specifications, and all governing agencies.

C. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property

END OF SECTION 312000

SECTION 31 4100 – SHORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this section.

1.2 SUMMARY

A. Furnish all labor, materials, equipment, and services necessary for and incidental to the execution and completion of shoring of existing structure without producing damage to the existing building structures. Work shall be performed by a Specialty Subcontractor.

1.3 RELATED WORK

A. Section 31 6350 – Helical Pile Foundations

B. Section 02 4119 – Selective Demolition

C. Division 03 – Concrete

1.4 PROFESSIONAL RESPONSIBILITY

A. Shoring for all existing structures shall be selected, designed, and supervised by a Registered Professional Engineer (hereinafter referred to as the "Construction Engineer") approved by the A/E. Engineering fees shall be paid for by the Contractor.

B. Contractor shall hire a registered structural engineer to design all structural members, connections, and temporary foundation elements required to support the existing structure during construction. Work includes but is not limited to the following:
   1. Shoring columns and connections for support of selective demolition of existing concrete strut columns.
   2. Temporary helical pile and concrete cap foundations for support of shoring columns.
   3. Shoring of building fascia steel members for repair of connections to concrete members.

C. Shoring shown on the contract drawings is only conceptual in nature. Final design and detailing of the shoring systems shall be the responsibility of the Contractor’s hired Professional Engineer.
   1. At the option of the Contractor – Morabito Consultants may be hired as the Contractor’s construction engineer for the purposes of temporary shoring.

1.5 SUBMITTALS

A. Detailed drawings and calculations of proposed materials and methods of installation of shoring.

B. Certification: Signed and sealed by the Construction Engineer specializing in this type of design and certifying that the temporary conditions/equipment and required shoring as analyzed, designed, and installed are in compliance with the requirements of the Contract Documents and all governing codes and will not produce damage to the existing building structures.

1. The Construction Engineer should schedule sufficient number of visits to the site to enable him to verify that the systems as installed meet the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete (for shoring): Compressive strength of 3,000 psi at the end of 7 days, with a minimum of 5.5 bags of cement per cubic yard of concrete. As specified in DIVISION 3.

B. Reinforcement (for shoring): As specified in DIVISION 3.

C. Plates, Angles, Bars and rolled S, M, and HP shapes: ASTM A 36 UNO.

D. Rolled Wide Flange Channel Shapes: ASTM A-992, Grade 50.

E. Rolled S, M, HP, ASTM A 572, Grade 50; or ASTM A-588, Grade 50.

F. Cold Formed Steel Tubing: ASTM A 500, Grade C.

G. Hot Formed Steel Tubing: ASTM A 50l.

H. Steel Pipe: ASTM A 53, Type E or S, Grade B.

I. Electrodes for Welding: Comply with AWS Code.
   1. Covered mild steel electrodes complying with AWS Code and ASTM A 233, Series E70. Use E70 Series, Grade SAW 1 for welding ASTM A 36 steel. Use E70 Low Hydrogen Series, Grade SAW 2 for welding ASTM A 992, Grade 50 steel.

J. Non-metallic Non-shrink Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD C-588.

K. Supports: Props, shores, jacks, needles, braces, sheeting, cribbing, etc., shall be materials standard with and available to the Contractor, which are of proper size and are in good serviceable condition. Materials that are unsuitable for the intended purpose, or which are severely damaged, shall not be used.

L. Materials and Techniques: Contractor's option, as approved; however, shoring shall be accomplished in such a manner as not to produce settlement in the existing building structures.

PART 3 - EXECUTION

3.1 DETENTION OF MOVEMENT

A. Inscribe or firmly affix benchmarks on columns and walls to be stored at locations as approved by the Construction Engineer. The method used is optional.

B. Take readings daily during the concrete repair operations of the existing structure.

C. Stop work, notify the Construction Engineer, and take immediate remedial action if movement of the existing structure occurs during progress of the work.

3.2 PREPARATION

A. Inspection: Examine the areas and conditions under which this work is to be installed and notify the Construction Engineer in writing of conditions detrimental to the proper and timely completion of the work.

B. Protection: During the progress of the work, the Contractor shall protect the occupants and contents of the existing buildings from damage or injury. The Contractor shall confer with the Construction Engineer and make arrangements with the Owner for his removal or protection of any building contents and personnel which may be affected by this work, or which are especially vulnerable to damage or injury.

3.3 PROPPING, BRACING, NEEDLING, SHORING ETC

A. All structural members shall be properly braced and supported as necessary to prevent any improper deflection or misalignment during the course of normal construction and abnormal loading.

B. Props, jades, needles, shores, bracing, sheeting, cribbing, lagging, etc., shall remain in place until such time as construction has sufficiently aged or has been permanently braced and is ready to withstand normal loading, abnormal loads have been removed, etc., and such removal has been approved by the A/E.

C. All required cutting and drilling in connection with this work shall be performed by the Contractor.

3.4 OPTIONAL METHODS

A. Contractor shall change methods of shoring, as approved to accommodate unforeseen conditions.

B. Any suggestions that the Contractor may have to expedite work of this Section, to promote greater safety, or insure a more practical or efficient installation will be considered for approval.

C. Contractor is responsible for all phases of work of this Section, regardless of the methods specified or used. He shall take all practical precautions to ensure the complete safety and sufficiency of the work under this Section and of related or existing work.

3.5 RESPONSIBILITY FOR PERFORMANCE

A. The responsibility for the performance of the shoring methods and devices shall lie entirely with the Contractor.

B. Any damage to persons, property, structures, or contents, due to cracking, movement, failure of other conditions caused by inadequate support (shoring) work, shall be made good by the Contractor without any additional cost to the Owner.

END OF SECTION

SECTION 31 6350 – HELICAL HPF FOUNDATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Condition and Division 1 Specification Sections apply to this section.

1.2 SUMMARY

A. Section Includes: Helical HPF Foundations (HPF) for Structural Support.

B. Related Sections.
   1. Section 31 2000 – Earth Moving
   2. Section 31 4100 – Shoring
   3. Division 03 – Concrete.

1.3 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designations number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:
   1. ASTM D1143 Standard Test Method for HPF Under Static Axial Compressive Load.

1.4 DEFINITIONS

A. Work consists of labor, materials, equipment, and services necessary for and incidental to the execution and completion of helical screw foundations as indicated on the drawings and specified herein.

B. Special definitions that apply to this section include:
   1. Power Installed Helical Pile Foundation: Consists of one or more helix-shaped steel plates welded to a central steel shaft, which can be either solid bar or hollow pipe. The shaft length can be increased by adding one or more steel shaft extensions, coupled together to form a continuous pier. The product is specifically designed as a deep foundation system to support structural loads from residential, commercial, and industrial buildings, towers and other structures. The product is fabricated from high-strength steel to resist bending moments and installation torque. Referred to hereinafter using the abbreviation “HPF”.

1.5 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Design HPF to meet the specified loads and acceptance criteria as shown on the drawings.
   2. Design power installed HPF application by Professional Engineer experienced in design of this work and licensed in the state of the project. Comply with the following requirements:
      a. Allowable Working Load in Compression: Per Plans and Details
      b. Allowable Working Load in Tension: N/A
      c. Lateral Load Plus Bending: N/A
      d. Maximum helical diameter: 14 inches

B. Performance Requirements: Provide power installed HPF that have been manufactured, fabricated, and installed to the capacities required by this specification.

1.6 BASIS OF CONTRACT

A. Contract shall be based on the number of HPF shown on the contract drawings, satisfactorily installed, conform to the dimensions, minimum load capacities shown on the contract drawings and specified herein. Payment for satisfactory HPF shall be on a fixed lump sum basis, with no adjustment for difficulties in execution from what may have been anticipated by the Contractor.

B. Quantities: If the number of HPF is increased due to the Contractor's inability to provide units of the specified capacity or to obtain minimum elevations, there will be no increase in the contract price to cover such additional HPF that may be required; further, the cost of enlarging foundations to incorporate large numbers of HPF of lower than specified capacity will be deducted from the contract sum.

C. No payment will be made for rejected HPF including HPF driven out of place, imperfect HPF, or HPF damaged in driving or handling.

D. Where HPF are adjacent to existing structures, HPF shall be installed as required to prevent damage to the existing building structure including injury to persons and damage to building contents.

E. Where minimum tip elevations are lowered to provide adequate HPF geotechnical capacities, adjustments to the lump sum amount shall be based on additional footage over the total base amount of footage required by the contract documents.

1.7 UNIT PRICES: See specification section 00 4100 and 01 2200.

A. Provide unit prices per foot of length for extending steel HPF below and above the base bid assumed lengths.

B. Provide unit price for additional HPF's.

1.8 QUALITY ASSURANCE

A. Installed Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity, and who is authorized and trained by the manufacturer to install its products.

B. Manufacturer Qualifications: Utilize products from a manufacturer maintaining a quality system in compliance with ISO 9001 Requirements.

C. Certifications: Certified mill test reports for the central steel shaft, as the material is delivered, for record purposes. Provide ultimate strength, yield strength, percent elongation and chemistry composition.

D. Preinstallation Meetings: Contractor & Registered Professional Engineer overseeing monitoring and installation shall meet at the site prior to initial installation to assure all project requirements are understood and satisfied.

1.9 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.10 JOB CONDITIONS

A. Site Information: No site-specific geotechnical information was available at the time of preparing these contract drawings. It shall be the responsibility of the Contractor and his/her specialty helical pile installer to determine appropriate geotechnical capacities.

B. Test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner.

C. The Contractor shall install the HPF in such a manner as to prevent settlement in the adjacent building structures. If settlement in an adjacent building structure occurs, the Contractor shall at no additional cost to the Owner, repair the existing building structure to the satisfaction of the Owner.

1.11 EXISTING UTILITIES

A. Locate existing underground utilities by careful hand excavation before starting HPF installation. If utilities are to remain in place, provide protection from damage during steel HPF installation.

B. Should uncharted or incorrectly charted piping or other utilities be encountered during HPF installation, consult the Engineer immediately for directions as to procedure. Cooperate with the Engineer and public or private utility companies in keeping their respective utilities to the satisfaction of the utility owner at no cost to the Owner.

1.12 COORDINATION

A. The Contractor shall be responsible for coordination and proper relation to the work of this section to the building structure and to the work of all trades. The Contractor shall visit the premises to thoroughly familiarize himself with all details of the work and working conditions, to verify all dimensions in the field, and he shall advise the Engineer in writing of any discrepancy before starting any work.

1.13 INSPECTION

A. The Contractor's specialty installer's registered professional engineer shall inspect and monitor pile installations.

B. The A/E (Morabito Consultants) general structural inspections on this project do not include detailed inspection or installation monitoring of helical piles.

C. The Inspection Agency's representatives shall keep a complete record of all operations and shall submit daily written reports to the A/E.

D. Installation Records: Provide the Owner copies of HPF installation records within 24 hours after each installation is completed. Include, at a minimum, the following information.

1. Name of project and Contractor.
2. Name of Contractor's supervisor during installation.
3. Date and time of installation.
4. Name and model of installation equipment.
5. Type of torque indicator used.
6. Location of HPF by assigned identification number.
7. Actual HPF type and configuration – including lead section (number and size of helix plates), number and type of extension sections (manufacturer's SKU numbers).
8. HPF installation duration and observations.
9. Total length of installed HPF.
10. Cutoff elevation.
11. Inclination/batter of HPF.
12. Installation torque at 1-foot intervals for the final 10 feet.
13. Comments pertaining to interruptions, obstructions, or other relevant information.
14. Rated load capacities.

E. The Inspection Agency shall submit to the A/E prior to the Contractor's request for payment on HPF certified reports showing the results of all inspection.

1.14 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer's product data and installation instructions.

C. Shop Drawings: Provide drawings indicating profiles and product components and accessories and indicate the following:
1. HPF number, location, and pattern by assigned identification number.
2. HPF design load.
3. Type and size of central steel shaft.
4. Helix configuration (number and diameter of helix plates).
5. Minimum effective installation torque.
6. Minimum overall length.
7. Inclination of HPF.
8. Cutoff elevation.
9. HPF attachment to structure relative to grade beam, column pad, pile cap, etc.

D. Quality Assurance/Control Submittals: Submit the following:
1. Design Data: Engineer's design data and calculations including HPF type, size, anticipated tip elevations, and installation criteria.
2. Test Reports: Certified test reports showing compliance with specified characteristics and physical properties.
3. Certificates: Submit the following:
   a. Manufacturer's certificate that products meet or exceed specified requirements.
   b. Manufacturer's Certificate of Registration for ISO 9001 compliance.
   c. Mill test reports as requested.
4. Installation equipment including drive motor specifications and load calibration reports.

E. Closeout Submittals: Submit the following:
1. Installer's Field Reports: Accurately record the following: Type, size, and actual locations of HPF, torque installation records on all HPF and torque monitoring calibration data.

PART 2 - PRODUCTS

2.1 HELICAL PILE FOUNDATIONS

A. Manufacturers
   1. A.B. Chance, a Division of Hubbell Power Systems, Inc.
   2. Alternate: Danbro Distributors.

B. Preferred Specialty Installer
   1. Levelift Foundations, LLC - Ellicott City, MD. Contact: Phil Schied, PE

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: Comparable products must be submitted for approval 10 days prior to receipt of bids.

2.3 MATERIALS (A.B. Chance)

A. Central Steel Shaft:
   1. Consists of lead sections, helical extensions and plain extensions, Type SS, HS, SS to HS Combination Pile.
   2. SS5 1 ½ inch Material: Hot rolled Round-Cornered-Square (RCS) solid steel bars meeting dimensional and workmanship requirements of ASTM A29. The bar shall be modified medium carbon steel grade with improved strength due to fine grain size. Minimum yield strength 70 ksi.
   3. SS150 1 ½ inch, SS175 1 ¾ inch, SS200 2 inch, SS225 2 ¼ inch Material: Hot rolled Round-Cornered-Square (RCS) solid steel bars meeting the dimensional and workmanship requirements of ASTM A29. The bar shall be High Strength Low Alloy (HSLA), low to medium carbon steel grade with improved strength due to fine grain size. Minimum yield strength 90 ksi.
   4. HS 3 ½ inch OD Material: Structural steel tube or pipe, seamless or straight-seam welded, in compliance with ASTM A53, ASTM A252, ASTM A500 or ASTM A618. Wall thickness is 0.300 inch (Schedule 80). Minimum yield strength 50 ksi
   5. 278 2 7/8-inch Material: Structural steel tube or pipe, welded, or seamless, in compliance
   6. with ASTM A500. Wall thickness is 0.203 inch (Schedule 40). Minimum yield strength 50 ksi.
   7. SS175/200 to HS Combo Pile Material: Type SS175 and SS200 and HS material as described above with a welded adapter for the transition from SS175/200 to HS.
   8. SS5/150 to 278 Combo Pile Material: Type SS5 and SS150 and 178 material as described above with a welded adapter for the transition from SS5/150 to 278.

B. Helix Bearing Plate:
   1. Hot rolled carbon steel sheet, strip or plate formed on matching metal dies to true helical shape and uniform pitch. Bearing plate material shall conform to the following ASTM specifications.
   2. SS5 Material: Comply with ASTM A572, ASTM A1018 or ASTM A656 with minimum yield strength of 50 ksi. Plate thickness 3/8 inch (9.5mm).
   3. SS150, and SS175 Material: Comply with ASTM A656, or ASTM A1018 with minimum yield strength of 80 ksi. Plate thickness 3/8 inch.
   4. SS200 and SS225 Material: Comply with ASTM A656, or ASTM A1018 with minimum yield strength of 80 ksi. Plate thickness ½ inch.
   5. 278 Material: Comply with ASTM A36 or ASTM A572 with minimum yield strength of 36 ksi (248 MPa). Plate thickness 3/8 inch.
   6. HS Material: Comply with ASTM A36, ASTM A572, ASTM A1018 or ASTM A656 depending on helix diameter, per the minimum yield strength requirements cited above. Plate thickness 3/8 inch.

C. Bolts:
1. The size and type of bolts used to connect the central steel shaft sections together shall conform to the following ATM specifications:
   a. SS5 and SS150 1 ½ inch Material: ¾ inch diameter bolt per ASTM A320 Grade L7.
   b. SS175 1 ¾ inch Material: 7/8-inch diameter bolt per ASTM A193 Grade B7.
   c. SS200 2-inch Material: 1 1/8-inch diameter bolt per ASTM A193 Grade B7.
   d. SS225 2 ¼ inch Material: 1 ¼ inch diameter bolt per ASTM A193 Grad B7.
   e. HS 3 ½ inch OD Material: ¾ inch diameter bolts (3 per coupling) per SAE J429 Grade 5.
   f. 278 2 7/8-inch OD Material: ¾ inch diameter bolts (2 per coupling) per SAE J429 Grade 5.

D. Couplings:
1. Formed as integral part of the plain and helical extension material.
2. For Type SS material, the couplings shall be hot upset forged sockets. For Type HS and 278 material, the couplings shall be hot forge expanded sockets.

E. Plates, Shapes or Pier Caps: For structural steel plates and shapes for HPF top attachments, conform to ASTM A36 or ASTM A572, Grade 50.

F. Corrosion Protection – Not Required

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Comply with the instructions and recommendations of the power installed HPF manufacturer.

3.2 EXAMINATION

A. Site Verification of Conditions:
1. Verify that site conditions are acceptable for installation of power installed helical screw foundations.
   a. Verify that all work of other trades is completed to the point where HPF may commence without restriction.
   b. Verify that all HPF may be installed in accordance with all pertinent codes and regulations regarding such items as underground obstructions, right-of-way limitations, utilities, tiebacks, etc.
2. Do not proceed with installation of power installed helical screw foundations until unacceptable conditions are corrected.

3.3 INSTALLATION

A. General:
1. The HPF installation technique shall be consistent with the geotechnical logistical, environmental and load carrying conditions of the project.
2. Installation equipment shall be rotary type, hydraulic power-driven torque motor with clockwise and counterclockwise rotation capabilities.
   a. Utilize a torque motor capable of continuous adjustment to number of revolutions per minute (RPM) during installation and with a torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed. Do not use percussion drilling equipment.
   b. Utilize equipment capable of applying adequate downward pressure and torque simultaneously to suit project soil conditions and load requirements, and capable of continuous position adjustment to maintain proper HPF alignment.

3. A calibrated torque indicator shall be used during HPF installation. The torque indicator may be an integral part of the installation equipment or externally mounted in-line with the installation tooling.

B. Central Steel Shaft Installation Procedure:
   1. Engage and advance HPF into soil in a smooth, continuous manner at a rate of rotation of 5 – 20 RPM. Provide extension sections to obtain the required minimum overall length and installation torque as shown on the working drawings. Connect sections together using coupling bolt and nut tightened to torque of 40 ft-lb.
   2. Apply sufficient down pressure to uniformly advance the HPF sections approximately 3 inches per revolution. Adjust rate of rotation and magnitude of down pressure for different soil conditions and depths.

C. Termination Criteria:
   1. Satisfy the minimum installation torque and minimum overall length criteria as shown on the working drawings prior to terminating the HPF.
   2. The torque as measured during the installation shall not exceed the torsional strength rating of the central steel shaft.
   3. If the torsional strength rating of the center steel shaft and/or installation equipment has been reached prior to achieving the minimum overall length required, the Contractor shall have the following options:
      a. Terminate the installation at the depth obtained subject to the review and acceptance of the Owner, or:
      b. Remove the existing Helical HPF and install a new one with fewer and smaller diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Owner. If reinstalling in the same location, the topmost helix of the new HPF shall be terminated at least 3 feet beyond the terminating depth of the original HPF.
   4. If the minimum installation torque as shown on the working drawings is not achieved at the minimum overall length, and there is no maximum length constraint, the Contractor shall have the following options:
      a. Install the HPF deeper using additional extension sections.
      b. Remove the existing HPF and install a new one with additional and/or larger diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Owner. If reinstalling in the same location, the topmost helix of the new HPF shall be terminated at least 3 feet beyond the terminating depth of the original HPF.
      c. De-rate the load capacity of the HPF and install additional HPF(s). The de-rated capacity and additional HPF location shall be subject to the review and acceptance by the Owner.
   5. If the HPF is refused or deflected by a subsurface obstruction, terminate the installation, and remove the HPF. Remove the obstruction, if feasible, and reinstall the HPF. If it is not feasible to remove the obstruction, install the HPF at an adjacent location, subject to review and acceptance by the Owner.
   6. If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to proper positioning of the last plain extension section relative to the final elevation, the Contractor may remove the last plain extension and replace it with a shorter length extension. If it is not feasible to remove the last plain extension, the Contractor may cut the extension shaft to the correct elevation. Do not reverse (back-out) the helical screw foundation to facilitate extension removal.
   7. The average torque for the last 3 feet of penetration shall be used as the basis of comparison with the minimum installation torque as shown on the working drawings. The average torque shall be defined as the average of the last 3 readings recorded at 1-foot intervals.

3.4 TOLERANCES

A. Single HPF shall be installed within 1-1/2 inches on design location. HPF in clusters of two or more, shall be installed within three inches of the design location.

B. HPF plumbness shall be within 2 degrees of design alignment.

C. Groups of HPF shall not be modified by addition of HPF of lower load capacities than those originally comprising the group.

3.5 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.

B. Any damage to persons, property, structures, or contents due to the installation of the steel HPF shall be made good by the contractor with no additional cost to the owner.

END OF SECTION